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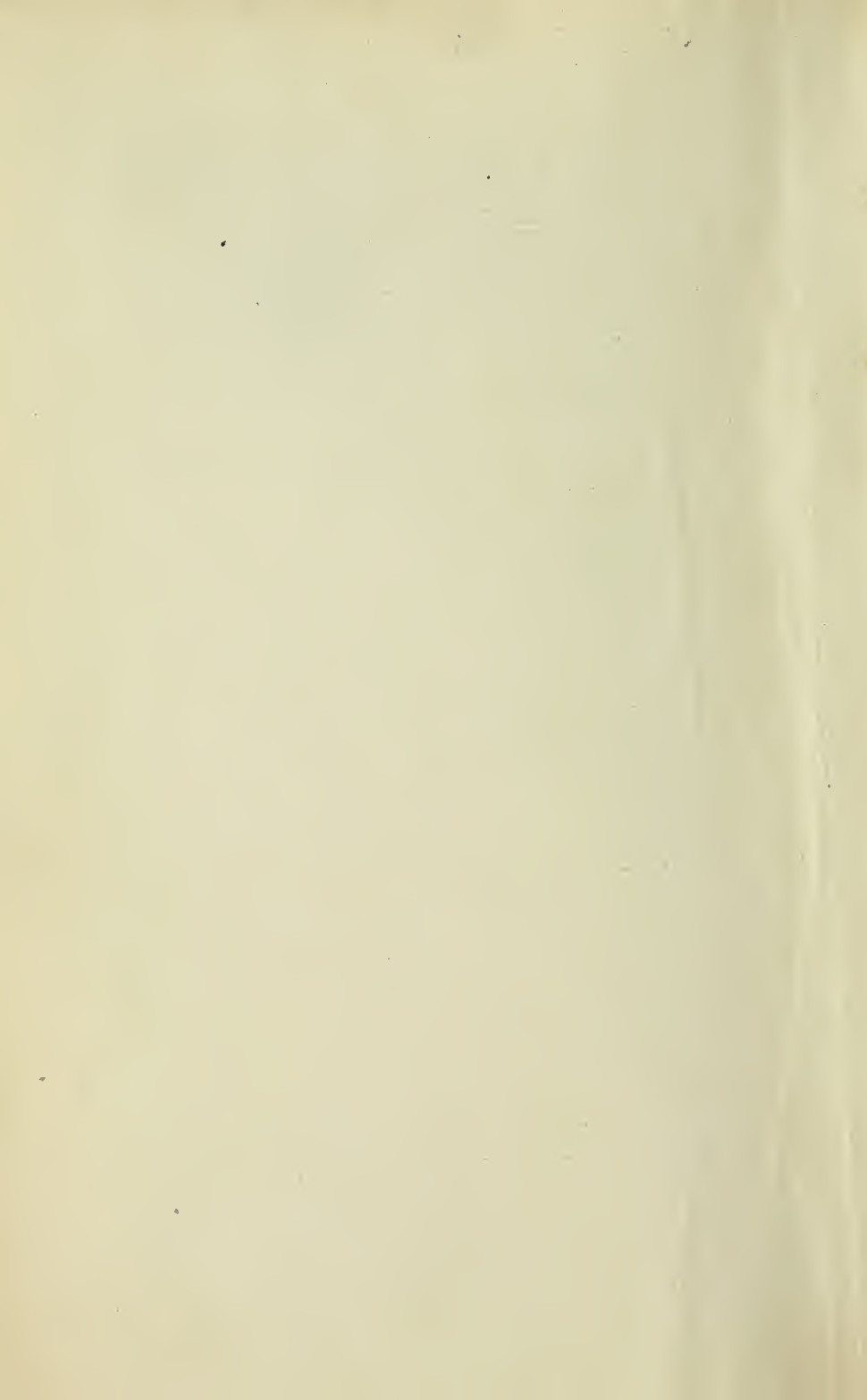
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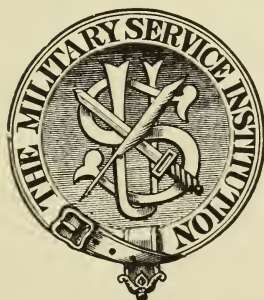
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THEO. F. RODENBOUGH



JAMES C. BUSH

EDITOR

ASSOCIATE EDITOR

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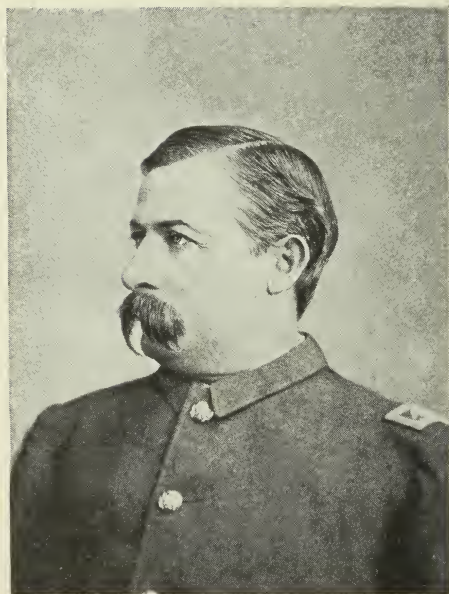
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1890

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JANUARY, 1890.

NO. I.

MILITARY AND NAVAL PENSIONS OF THE UNITED
STATES.*

BY MAJOR-GENERAL O. O. HOWARD,
UNITED STATES ARMY.

I. REVOLUTIONARY PENSIONS.

IN the fall of 1776, when Washington was sitting up night after night, depriving himself of essential sleep, to urge by repeated entreaties and arguments, that the Continental Congress furnish him an army, properly organized and reasonably equipped, one measure, then reluctantly granted, has become the corner-stone of the pension system of the United States. It was a Joint Resolution passed August 26th, which, it was hoped, would secure a fair pension to those soldiers who had been, or should be, disabled during the War of Independence.

Notwithstanding the danger, then much feared, of trenching upon the powers of the States, Congress granted direct *Military* and *Invalid* Pensions for about nine years; then, in 1785, the States consented and did pay the pensions on the recommendations of Congress, the Congress humbly confessing its inability to raise the necessary funds.

*Read before the Military Service Institution, November 23d, 1889.

This method was continued until September 29th, 1789. As soon as the new Constitution was launched and in vogue, the power of Congress to pay pensions to soldiers and sailors was unquestioned. We then find pensions established as such for life, and regularly paid by annual appropriations.

All these pensions were confined to disability more or less pronounced; and they accrued by reason of service during the war, and were what the Pension Bureau now denominates *Invalid Pensions*.

An Act approved April 10th, 1806, limited the disability to "Known wounds received during the Revolutionary War," and extended its benefits to any one in any proper service against the common enemy.

It was not till March 18th, 1818, nearly thirty-five years after the Treaty of Paris, which closed the Revolution, that our Congress saw fit to grant *service pensions*, and even these were restricted to the indigent; there being monthly payments, for indigent officers \$20.00 and enlisted men \$8.00.

Under the Invalid Pension Laws (March 23d, 1792, February 28th, 1793, March 16th, 1802 and April 10th, 1806,) an officer received half his pay (but not above half a lieutenant-colonel's) for total disability and an enlisted man \$5.00 per month. It is a notable fact that the children of Revolutionary soldiers never received a pension, but the widows did so for five years, or until remarried.

Under the Act of May 15th, 1828, all those who served to the end of the war, officers and enlisted men, then living, were pensioned on full pay (the highest not to exceed a captain's) and the indigent provision was omitted. These benefits were extended to *all survivors* by Act of June 7th, 1832.

As late as June, 1888, that is, 105 years after the war, there were 37 worthy widows who drew pensions. During that year there had been added three widows whose ages were respectively 84, 80 and 92. The last soldiers drawing pensions on the general roll had celebrated their own centennial. They were aged, at the time of death, respectively, 102 and 101 years. The former died May 3d, 1866 and the latter February 18th, 1867.

Two other veterans were added to the roll in 1867. They died, the one April 5th, 1869 and the other March 28th, 1869, aged, respectively, 109 and 105 years.

The whole number of officers and soldiers and their widows

who received the two sorts, to wit: *the Invalid* and *the Service pension* for the Revolutionary War, according to the roll of 1888, was 62,069. The amount of money paid is about \$38,500,000.

Before closing this glimpse into the apparent liberality of our ancestors toward their soldiers, permit me an expressive extract from the first annual message of President John Quincy Adams, of date December 6th, 1825. He says:

“The Act of 18th of March, 1818, while it made provision for many meritorious and indigent citizens who had served in the War of Independence, opened a door to numerous abuses and impositions. To remedy this, the Act of 1st of May, 1820, exacted proofs of absolute indigence, which many really in want were unable, and all, susceptible of that delicacy which is allied to many virtues, must be deeply reluctant to give. The result has been, that some among the least deserving have been retained, and some in whom the requisites both of worth and want were combined, have been stricken from the list. As the numbers of these venerable relics of an age gone by diminish; as the decays of body, mind and estate, of those that survive must, in the common course of nature, increase; should not a more liberal portion of indulgence be dealt out to them?”

“May not the want in most instances be inferred from the demand, when the service can be duly proved; and may not the last days of human infirmity be spared the mortification of purchasing a pittance of relief only by the exposure of its own necessities?”

“I submit to Congress the expediency either of providing for individual cases of this description, by special enactment, or of revising the Act of the 1st of May, 1820, with a view to mitigate the rigor of its exclusions in favor of persons to whom charity, now bestowed, can scarcely discharge the debt of justice.” It was subsequent to this message that the liberal legislation of 1828 was obtained. Surely the principles which President Adams so admirably set forth are of universal application. Now as then, the unworthy and fraudulent claimants cripple the just dues of the deserving.

II. PENSIONS OF THE WAR OF 1812.

When, after the sudden declaration of war and the breaking out of terrific hostilities on the Canadian border, it became necessary to raise additional military force, Congress passed and the

President approved, January 11th, 1812, the bill for ten new regiments of infantry, two of artillery and one of light dragoons.

In this Act itself we find a section which provided for individual pensions. It was substantially a re-enactment of a section of the law of April 10th, 1806, which with slight modifications had been repeated from, time to time, since 1790.

"Any officer or enlisted man disabled by wounds or otherwise while in the line of his duty in public service" was to be placed on the list of invalids and receive a pension, the highest rate never to be above half a lieutenant-colonel's pay. For an officer it was not to exceed half his monthly pay, the amount to be graded down according to the nature of the wound or disability; for an enlisted man the highest rate was \$5.00 per month with a proportionate decrease for the lesser injuries. A larger liberality, however, was shown than toward our Revolutionary sires, in that in case of death in, or by reason of, service, not only was the widow provided for for five years, but where there was no widow (or she ceased to be a widow) the orphan child or children under 16 years of age had the designated allowance.

It is most probable that this more generous pension provision put into the very Act for raising troops was intended for the purpose of stimulating enlistments; for we know from history how unpopular at its outbreak that war of 1812-14 was.

Again in January, 1813, when 20 regiments more were added to the Army the same pension provision was inserted, besides some liberal grants to both officers and enlisted men; for example, refunding to officers extra expenses for attending courts-martial and for forage of horses; and to enlisted men, on discharge, travel pay and money value for rations.

At the close of the War of 1812, the Act of August 2, 1813, extended provisions similar to those enjoyed, under the general law, by the Regular Army, to volunteers and militia.

When the smoke of the conflict had somewhat passed away, with a view to getting better pensions for officers of low rank and for enlisted men, President Madison, in a special message to Congress, February 20th, 1815, ventured to say: "I recommend to your care and beneficence the gallant men whose achievements, in every department of the military service, on the land and on the water, have so essentially contributed to the honor of the American name and to the restoration of peace.

"The feelings of conscious patriotism and worth will animate

such men under every change of fortune and pursuit, but their country performs a duty to itself when it bestows those testimonials of approbation and applause which are at once the reward and the incentive to great actions."

But no extended or substantial legislation came from Mr. Madison's earnest and appreciative appeal, so, in a subsequent message, December 15th of the same year, he again pleaded as follows:

"As an improvement on our military establishment, it will deserve the consideration of Congress whether a *corps of invalids* might not be so organized and employed as at once to aid in the support of meritorious individuals excluded by age or infirmities from the existing establishment, and to preserve to the public the benefit of their stationary services and of their exemplary discipline."

The response to this is found in the Act of April 16th, 1816, extending the list of pensions and granting lands, and an Act approved April 24th, 1816, increasing pensions of enlisted men and officers of low rank. It gave a first lieutenant \$17, a second lieutenant \$15, a third lieutenant \$14, an ensign \$13, and an enlisted man \$8 per month. These allowances were as usual for highest grade of disability—to be less for smaller hurts. These same provisions were intended to embrace the Navy, and were extended to the militia which had been in the United States Service.

By several Acts of Congress, the last in 1858, the limit of five years, though it had been often renewed, was removed from all pension of widows, and children under sixteen. The Commissioner of Loans in each State or district, or some other officer named by the Secretary of War, was for a long time the medium of reaching and enabling the pensioner to get his pay. In fact, until 1833, the War Department paid pensions that pertained to its soldiers, and the Navy Department to its sailors and marines.

The first *service pension* for survivors of the War of 1812 was granted by the Government in 1871, *fifty-seven years* after the war closed.

The provisions for this *service pension* of \$8 per month from February 14th, 1871, embraced all survivors, officers and enlisted men, the Army and Navy included, who had had a service of sixty days, with some specific cases that had served less than

sixty days, and widows of soldiers in that war who had been married before the close of it. Proof of loyalty was required. The Act of March 8th, 1878, removed the conditions of date of marriage and of loyalty, reduced the necessary service to *fourteen days or service in a battle*. Widows' pensions under these acts were increased by Act of March 19th, 1886, to \$12. The whole number of pension claims allowed for this war (1812) is reported to be 60,670, and the cost to June 30th, 1888, has been \$36,310, 256.04. The pensions of invalids and widows, and children of deceased officers and men granted under the general pension laws are not included in this sum, except where since 1871, the invalid pension has been consolidated with the service pension.

III. THE MEXICAN WAR PENSIONS.

The veterans of the Mexican War and their families have a similar pension history; *first*, the usual *invalid pension*, to the wounded and disabled, to the widows and to the children, substantially the half pay system, was kept up till *the service pension* was established January 29th, 1887, 39 years after the close of the war with Mexico.

The service pension, after deducting deaths, had increased the rolls of June 30th, 1889, by 17,065 survivors, and 6,206 widows, a total of 23,271. Hence the total Mexican war pension claims so far allowed have been 24,724, and it is estimated the total cost to the Government will be \$13,000,000.

IV. THE REGULAR ARMY PENSIONS.

In the several wars the Regular Army has not been so separate in pension matters from the volunteers as to give it a separate and individual history.

There has been an occasional spasmodic increase and then a dropping back to normal numbers on a peace footing. The Army has always been more or less refreshed by numerous Indian conflicts on the frontier and a few metropolitan or village riots. The system of pensions, however, according to the statutes established for the regular force has been, till late years, the basis for the militia and volunteers, and the naval officers and men have been cared for on a corresponding apportionment; first, on the half pay system, never excluding that of lieutenant-colonel's pension, for total disability, and \$5 per month for enlisted men.

Afterwards, for cases rated as total disability, there was an in-

crease to \$30 for lieutenant-colonel and upwards, \$25 for major, \$20 for captain, \$17 for first lieutenant, \$15 for second lieutenant, \$10 for cadet-midshipman, and certain warrant officers, and \$8 for all other enlisted men.

In the Pension Reports we find grouped under the head of Army and Navy, not only the Regular Army and Navy pensions, but all pensions granted for disability or to widows and children (except the various service pensions), therefore, we must consider the Regular Army as being entitled to *invalid pensions* only, except for those Regular officers and men who took part in the two wars for which *service pensions* have already been granted. Among these pensions are placed the very large number granted by Acts allowing larger sums for specific disabilities in the War of the Rebellion, larger than is allowed by the general law for total disability; to these, all of the Regular Army, as well as the volunteers disabled in that war, are entitled.

RATES OF PENSIONS.

Turning to the Pension Report of 1888 we find a table, which covers a page with figures, with this heading: "Table VII. Statement showing the different monthly rates of pensions, and the number pensioned at each rate, of the Army and Navy invalids, and of the Army and Navy widows, minors and dependents (War of 1861) on the roll June 30th, 1888."

In that table 262 Army and 11 Navy invalids receive \$1 per month, while 124 Army and 29 Navy receive \$72 per month. Between these rates of \$1 and \$72 there are 122 grades of pay. The largest number of beneficiaries in any one grade is 69,210 at \$4, the next largest 63,142 at \$8. By special acts two invalids and three widows are pensioned at \$100 per month; four widows, minors or dependents at \$166.66 2-3 per month and three at \$466.66 2-3.

V. THE PENSIONS FOR THE WAR OF THE REBELLION.

The Act of Congress, July 22d, 1861, which authorized the first 500,000 volunteers against the Rebellion, in its sixth section provided that any volunteer that might be wounded or disabled in service should have all the benefits conferred in the Regular Service, and that the widow or heirs, in the case of death, in addition to arrears of pay and allowances, should receive \$100.

July 25th brought further authority for raising volunteers not

to exceed 500,000, to be placed upon the same footing in all respects with similar corps in the United States Army. Again, the Act of August 6th, 1861, legalized the acts, proclamations and orders of the President touching the Army, Navy, militia and volunteers which had been done or issued from March 4th, 1861, to that time. So that, even before special pension provisions, the great Army and Navy of 1861, so suddenly called into the field, was put, in respect to death, wounds or other invalidship, on the same general basis as the Regular Army.

But lest there should be any class of military or naval servants of the Republic excluded by the general law, the lengthy bill entitled "An Act to grant pensions," became a law July 14th, 1862.

This does not depart from the highest rates already given, but is quite specific; and an Act passed two days later lays down the assimilated rank of the Army and Navy, *e. g.*, rear admirals corresponding to major-generals, commodores corresponding to brigadier-generals, captains corresponding to colonels, etc., etc.

Since the enactment of this law, on account of the abundant legislation and the prevailing desire to meet cases of great hardship, the old system of rating the disability of enlisted men, disabled in the War of the Rebellion, has, of late years, been departed from. The gradual lifting up of the amounts allowed for the various specific disabilities has at last virtually overturned all the regular arrangement to which we have referred. To closely exhibit the present status of pension legislation I have copied a brief table of disabilities with their respective ratings.

Mr. Ohren, in *The Statesman* for July, remarks: "In 1865 a special rate of \$20 a month for a permanent disability to perform any manual labor was created.

"In 1872, this rate was increased to \$24, and 1883 to \$30. By this last act the private was placed upon the same footing as the lieutenant colonel. * * *

An officer or any member of his command is now entitled to \$100 for the loss of both hands, and the same principle of equality distinguishes all the rates of \$30 and upwards.

When the pension laws were consolidated in 1873, provision was made for an \$18 rate for any disability less than that arising from the loss of a hand or foot, and under this rating most of the pensions have ranged from \$1.00 to \$18 per month.

In addition to the eight and eighteen dollar rates there are

three higher grades for non-specific disabilities. Third grade \$24, second grade \$30, first grade \$50. The \$24 rate which has been spoken of already is paid on account of those permanent disabilities, which medical experts consider are equivalent to a loss of a hand or foot.

TABLE FROM PAGE 195, *The Statesman*.

Disabilities.	From July 4, 1864.	From March 3, 1865.	From June 6, 1866.	From June 4, 1872.	From June 4, 1874.	From Feb. 28, 1877.	From June 17, 1878.	From March 3, 1879.	From March 3, 1883.	From March 3, 1885.	From Aug. 4, 1886.	From Aug. 27, 1888.	From Feb. 12, 1889.
Loss of both hands.....\$	25.00			31.25	50.00		72.00						100
Loss of both feet.....\$	20.00			31.25	50.00		72.02						
Loss of both eyes or the sight of both eyes.....\$	25.00			31.25	50.00		72.00						
Loss of an eye, the sight of the other having been previously lost.....\$			25.00	31.25	50.00		72.00						
Loss of one hand and one foot.....\$		20.00		24.00		36.00							
Total disability in one hand and one foot.....\$			20.00	24.00		36.00							
Total disability of one arm or leg.....\$											36.00		
Loss of a hand or of a foot, or total disability therein.....\$			15.00	18.00					24.00		30.00		
Amputation of a limb at or above elbow or knee.....\$			15.00	18.00	24.00				30.00		36.00		
Amputation at hip joint.....\$			15.00	18.00	24.00			37.50			45.00		
Total disability in both hands.....\$			25.00	31.25	50.00		72.00						
Total deafness, both ears.....\$				13.00								30.00	
Amputation at shoulder joint.....\$										37.50	45.00		

The \$30 rate is awarded for disabilities incapacitating veterans from the performance of any manual labor; and there is a sentiment in favor of the adoption of this rate as the basis for all ratings for non-specific disabilities.

To have a rate of \$8 for *total disability* for the performance of manual labor, with the intermediate rates at \$18 and \$24, and another rate of \$30 for a *total disability* from the performance of *any* manual labor, is a slight verbal distinction, with a \$22 difference, that creates a good deal of confusion of thought in military circles on the subject of pensions.

The sum of \$30 can be divided as readily as the sum of \$8 or \$18, and its adoption as a common standard would obviate the necessity of keeping constantly in view, subordinate standards of stiffened joints and amputated extremities. * * *

The \$50 rate is paid in cases in which there is a permanent disabled condition requiring the regular aid and attendance of another person. But some soldiers so disabled are receiving \$72 per month because Congress when it passed the Act creating this grade, ordained that all those pensioners receiving \$50, June 16th, 1880, or had a claim pending at that date upon which they were entitled to \$50 a month should received \$72 a month ; but that all persons who filed their claims subsequent to that date should receive but \$50 a month. This is virtually a proclamation that those who from patriotism, perhaps, did not file their claims, until want compelled them to, are to be placed at a disadvantage, and paid \$22 a month less for a given disability than those who were on hand bright and early June, 1880."

There are a good many of these inequalities in the pension laws, 3,370 bills have been enacted into law granting pensions to individuals that were not entitled to pensions under the general legislation, or, not to pensions of a satisfactory size.

From this casual glance, which could easily be carried to the cases of widows and other dependents, it is evident that great inequalities, and consequent injustice have grown out of attempts to remedy existing specific evils and individual misfortunes. There are great difficulties in the way, not only of the makers of the laws, but of those who are called upon to execute them.

The numbers of pensions, that had, up to June 30th, 1889, come upon the rolls of the Government from the Rebellion, including the small number occasioned by the service of the Regular Army and Navy, in peace, were, viz.: Invalids, 284,895, widows, minors and other dependents, 245,131, that is, a total of 630,026 beneficiaries ; which have cost the Government over 1,000 million dollars.

THE PENSION MANAGEMENT.

The number of pensioners attributable to the Rebellion, remaining on the roll at the end of the last fiscal year was about 470,000. For a bird's-eye view of our present pension establishment, I quote a few items from the "Encyclopædia Britannica."

There is in the present Bureau of Pensions: "In all a force of 1,554 persons directly engaged in settlement of claims for pensions.

In addition to these there are at various points throughout the country 2,515 surgeons whose duty it is to examine all applicants for invalid pension who may be ordered before them, and report to the Commissioner of Pensions as to the degree of the applicant's disability. This makes over 4,000 persons under the management and direction of the Commissioner. In addition to this, there are 18 pension agents for the payment of pensions, conveniently located through the country. * * * The salaries and expenses of this large force for the fiscal year ending June 30th, 1888, amounted in the aggregate to \$3,262,524.67.

"The total amount expended by the Bureau of Pensions during that year was \$82,038,386.59, being $21\frac{1}{2}$ per cent. of the Government's (estimated) gross income, \$380,000,000; and 31 per cent. of the entire expenditures, \$267,924,801.13, of the United States for the same period. * * * During the same fiscal year \$1,439,530.10 were paid as fees to attorneys alone."

The aggregate amount paid on account of pensions from 1791 to June 30, 1889, has been \$1,134,933,755.63.

DISCUSSION AND REMARKS.

Having now presented a meagre historic sketch of this subject for the four wars, we may add that various Acts of Congress have established the same provisions in connection with our Indian conflicts.

Now, with a view to discuss some important questions let us premise by a recapitulation of the classes entitled to pensions.

1. *Invalid pensioners*, viz.: Officers of the Regular Army, volunteers and militia; officers of the Navy, including the Marine Corps; and those enlisted in the military and naval force who have been rendered invalid by wounds or injuries received, or by disease contracted on duty.

2. *Widows*. The widows or children, under 16, of officers and enlisted men who have died from wounds received, or disease contracted while on duty. (The widow of a deceased soldier prior to 1861 was not entitled to a pension except when the cause of death originated in some war—correspondingly in the Navy; she received no pension unless her husband's death occurred in service.)

3. *Dependents*. Dependent mother, father or minor, brothers or sisters of those who died from wounds or disease having left no

widow or minor children. (These must have been more or less dependent at the time of the beneficiary's death.)

4. *Service pensioners.* These include all the above classes entitled under the several Acts of Congress to pensions less than *the service pension*; and also other survivors for their services in the Revolutionary War, the War of 1812, and the Mexican War.

I remark, *first*: Consonant with the foregoing review, my previous conviction has been strengthened, that it has been the intention of our legislators and our Presidents, who express the will of the nation, without regard to party divisions, to deal as liberally as practicable with the nation's defenders; and further, I cannot detect any desire or settled purpose on the part of the administrators of the Government's bequests to defraud, or treat with injustice, those whom the law proclaims as beneficiaries. It should be remembered how the various soldiers' homes are provided and filled; how wholesome are the retired lists of the Army and Navy; how soldiers have been favored in the matter of employment; how bounties have been paid; how thousands of homesteads have been secured by them, by the law shortening the requisite number of years to complete the title; and how generously, in most of the States, soldiers have been placed in positions of public trust and responsibility. The vast majority have a livelihood, are proud of their service, and are happy.

Second. As to *the irregularities and injustices* which exist in the superabundant legislation on this subject, some of the causes have been hinted at. They should be and can be fully remedied. For example: Suppose a special commission be appointed of seven members or more, composed of the wisest and best men of great legal and judicial experience, with instructions to revise and codify all pension legislation and all pension regulations thereunder. Also enable said commission to draw such appropriate bills and such appropriate regulations as would embody the evident intention of the nation, and submit the same for re-review and action by Congress and the Executive. Every good soldier would rejoice at such considerate, complete, and thorough action. This statesmanlike work, could, probably, be effected without party division.

Third. As to a general service pension I do not yet advise it; first, because the claims of the invalids and their dependents must first be attended to. The requisite sum for a *general service pension*, *i. e.*, a pension for everybody, would be so great that

it would necessarily create public discontent and take from those who were good soldiers something of the warmth of affection and heroic sentiment which they have excited, and still excite, among the people at large. I believe that a Post of the Grand Army of the Republic, in New York City, embodied the common sentiment of living soldiers when it declared, that as much real patriotism may be displayed by refraining in time of peace from inflicting unnecessary burdens on the country as by coming to her defense in time of war; and that any soldier, who applies for, or accepts a pension that he does not justly deserve for disability incurred, or receive as a reward of service when he is too old to labor, is guilty of conduct likely to injure the men who were and are willing, without any reward beyond the approval of their own consciences and that honorable fame which is dear to every patriot, to give their blood and their lives for their country.

I said I do not yet advise the service pension. After thirty-five years, as in the Revolutionary War, that is, in the year 1900, the conditions of survivors may admit, or call for, the service pension; but the fifty-seven years from the War of 1812, which elapsed before the survivors of that war received the service pension, affords a better example. Perhaps fifty years from the close of the War for the Union, that is, in the year 1915, the nation could celebrate a jubilee, and bestow upon every survivor of the great army, which redeemed it, a reasonable and honorable pension.

Fourth. Frauds in connection with a national gratuity, as in securing the bestowal of personal benevolence, unfortunately, will be attempted.

General Andrew Jackson said concerning them in a message to Congress in 1834: "Circumstances have been recently developed showing the existence of extensive frauds under the various laws granting pensions and gratuities for Revolutionary services. * * * I therefore recommend * * * that an actual inspection should be made in each State into the circumstances and claims of every person now drawing a pension. The honest veteran has nothing to fear from such scrutiny, while the fraudulent claimant will be detected, and the public treasury relieved to an amount, I have reason to believe, far greater than has heretofore been suspected." President Jackson made a further suggestion that all payments should be suspended till the necessary reports were received. Of course, the chances for attempting

fraud, as human nature has not much changed since the days of Andrew Jackson, are a hundred-fold greater with the enormous pension list of to-day. Claim agents, even when thoroughly honest, have, nevertheless, enormous interests at stake. When their offices and hall-ways are filled with unsettled claims from floor to ceiling, temptations are great to use every effort to secure re-rating, higher and higher, and most speedy action. Business enterprise in this age of tremendous vigor urges the employment of every unforbidden means; and who can say where enterprise ends, and avarice begins. For one, it would please me if every beneficiary could secure his pension without the intervention or the fee of the claim agent.

Fifth. Perhaps the complaints which are most numerous and best founded come from the delays in the granting of claims which are most worthy and undisputed. Speaking of the year 1888, a newspaper says, that of the 35,089 cases allowed 28,282 had been held in the office for *two years* or longer; 18,353 *five years* or more; 10,262 *nine years* or more! The report for the same year shows that there were under examination 414,448 unadjudicated cases; a year before that there were 374,354; two years before there were 306,971, and three years before there were 280,666, such cases showing an unhappy accumulation from year to year, which indicates either that the force in the department has been too small or that the methods of organization and work were radically wrong.

Sometimes in a Government bureau of ancient lineage and long aristocratic standing there has crept in what statesmen call "circumlocution." Often the same paper, that a single official should dispose of, passed, in this system of circumlocution, through the hands of eight or ten manipulators, and so a day was wasted with little accomplishment. Whether this, or anything like it, is still true of our pension department, the waiting soldiers do not know; but the accomplished men who are now responsible have doubtless ascertained or can ascertain; and, I doubt not, have sufficient courage to stand to their convictions, and obtain from their employés most thorough and effective work.

Some of the cases of waiting we know are very sad; but the organizations of the veterans of the war endeavor to take care that no comrade shall be left utterly without help in the midst of his misfortune; and the families of the deceased, through them and the different Women's Relief Corps, are not neglected.

So, with a sanguine feeling, I am confident that all old soldiers

and their friends, having stated their case, can trust Congress, and its executive branch—the Pension Bureau—to take proper and thorough measures to remedy this evil of delay, and other evils of administration necessarily incident to so large an establishment.

The pension laws themselves, we need to emphasize it, require complete and careful revision; and at the same time they should be so simplified that an expert be not required to understand and interpret them to a claimant; nor an attorney to plead for him with the bureau for the highest of several rates possible under different interpretations of the law.

Agreeing fully with all who are interested in pensions to exclude with care those who willfully deserted the Service or shirked their duty by any sort of contrivance, I have in this paper relied upon our comrades, as in the war, for the highest motives of patriotism.

No soldiers in any country have been more highly commended for their spirit of self-sacrifice and supreme devotion. Let no subsequent wrangling, self-seeking, or anything, akin to begging, be ever allowed to soil the soldier's pure escutcheon.

Believing such to be the general feeling among the survivors of our last war, I am confident of the happy settlement of every vexed problem that now disturbs or concerns us.

(For Discussion on this Paper, see "Comment and Criticism.")

THE DANGER TO THE COUNTRY FROM THE LACK OF PREPARATION FOR WAR.

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IT is proposed to treat the subject under several heads.

1st. What are the dangers?

2d. Can they be averted?

3d. What would be the probable results—immediate and ultimate—if any of these dangers are not in time provided against?

THE GREATEST DANGER.

I. The greatest danger is the one which is the most apparent: that danger which every one called upon to meet a novel contingency for which he is unprepared, incurs: the danger which faces the sailor when his ship with all sail set is struck by a sudden storm: that danger to which every banker or business man is subjected, if, when a financial crisis comes, he has not foreseen and prepared for it. A ship captain who, for fear of a storm, is always furling sails will not make much progress in his voyage. A banker or business man who, in constant dread of a financial crisis, is deterred from entering into sound and feasible business relations, will be outstripped by his neighbors in profitable investments.

LOOKING AHEAD.

Hence, whilst it is not well to be an alarmist—constantly predicting disaster—it is well to look ahead as far as possible, and make suitable provision for a contingency which most thinking men regard as probable.

LARGE STANDING ARMIES.

It is a very old maxim that in time of peace we should prepare for war, but republican governments are proverbially mistrustful of large standing armies, and they have good reason to be. For when large masses of men are withdrawn from the *producing*

classes and are organized into a *consuming* class, they soon become separated from the mass of their countrymen by occupation, interest and sentiment, and are but too apt, in time, to become the willing tools of those on whom they are dependent for their pay, their subsistence and the existence of their organization. Where old, long established, monarchical governments stand close alongside of each other, as in Europe, the whim of a crowned head, the ambition of a prince, or a petty squabble, is often sufficient to induce two armies to hurl themselves against each other in a struggle to test their relative prowess, or the comparative strength of their rulers. Hence the apparent necessity in those countries, for each government to keep up immense standing armies ready at any moment to meet the contingency of war in resisting encroachments, or protecting the weak from the assaults of the strong lest these should become stronger, and destroy "the balance of power." In these struggles the welfare of the people, as a whole, is generally lost sight of. Were it out of the power of any of these nations to go to war with another without the consent of the people, there would no longer be the same necessity for such immense armaments.

In this country, where so much of the continent belongs to one nation with no powerful rival in close contact with it, the need for a large standing army is not felt; nor are there apt to arise those thousand and one pretexts for hostilities which exist with nations less favorably situated. In addition to this is the fact that by our fundamental law the Executive has not the power to declare war; for although this provision does not actually *prohibit* war, it is a great check upon the actual declaration of it.

SUDDEN WAR.

The danger in our case will be enhanced by the *sudden* arising of a necessity for war. Wisdom has warned us against entangling alliances with other nations, liable to result in our being compelled to adopt their quarrels and being forced into war as a consequence of them. It being the fixed and true policy of this country not to maintain large armies in time of peace, the serious question which presents itself, is, What are we to do in the accidental emergency of war?

WAR DURING AN ELECTION.

Before, however, considering this question it might be well to look at another danger which would, very materially, increase the

peril of our suddenly becoming involved in war. Of this greater danger recent occurrences have a tendency to remind us all. Should war come on on the eve of, or in the midst of a presidential election, the danger to us and our institutions would be tremendously increased. To be threatened by an invading force at a time when the whole country was torn up with a heated political campaign, in which the very question of peace or war might still farther inflame partisan passions, would add very much to the difficulties of preparing to resist a foreign foe. Our dangers, too, would be very much enhanced were it to happen that a presidential election should occur in the midst of war. Perhaps these are dangers which are inseparable from our system of government and hence cannot be averted; although the possibility of such dangers might suggest what has sometimes been urged, on other grounds,—the lengthening of the presidential term—with the hope that this might lessen the chances of the dangers here referred to. The possession, by a foreign foe, of the city of New York during an election would have a good deal more effect in changing the complexion of the electoral college than bushels of Murchison or Morey letters.

WHAT WOULD BE DONE?

Without indulging in too much fancy it might be beneficial to speculate in regard to what would probably be done in case this country was suddenly involved in war. From this speculation it may be possible to draw inferences from what we *would* do as to what we *ought* to do beforehand, so far as can with propriety be done.

TIME NEEDED.

The most important element for us would be *time*. Time to prepare for the death struggle with a powerful adversary. For in a great country like this with free institutions, and more than eight millions of free-men available for military duty we would all look forward to a most desperate struggle sooner or later. Time would be required to organize and provide for the large armies on which the ultimate result would probably depend. For these operations the more time we can have the better. Just at this time, with a good *pre-arranged* system, we could, with the large number of veteran soldiers left by the late war, organize and equip, in a comparatively short time, a very considerable body of tolerably efficient troops—troops which would be very formid-

able in resisting the invasion of a hostile force. The first and most important matter then will be to provide for lengthening as much as possible the *time* needed for bringing into existence our armies and providing for them. This at once brings to the front the necessity of an efficient and formidable naval force; for our first line of defense is our extensive sea-board. Our only means now for defending our sea-ports are our naval vessels and our torpedo system, for our land defenses, proper, are worthless. Were war proclaimed to-day against us, a strong naval force would probably be at once sent against one or more of our principal sea-ports, with a view of getting possession of them for use as starting points and depots for armies of invasion. Our sea-coast is so extensive that it would be a very easy matter for a hostile force to land and effect a footing at one of a hundred different points, but the possession of a good harbor would facilitate matters very considerably and its capture be well worth the risk of a speedy expedition. To resist this, all our available naval vessels should be at once concentrated at the principal harbors, to resist the entrance of the enemy's ships, and an efficient system of land torpedoes prepared for each. There is no denying the fact that to-day our navy is in no condition to make much of a stand against such a force as could be sent against us by several of the great powers of the world; but, thanks to the impetus given to naval affairs in the last few years, this defect is being rapidly overcome and it is hoped in a few years more we shall have a very respectable and formidable array of naval vessels. In the meantime the less formidable our naval force the greater need to supplant it, for each harbor, with a well-equipped torpedo system. Large appropriations should be made for torpedoes, and a supply of them kept on hand convenient to every large sea-port on the coast. The artillery troops on the sea-board should be well instructed in their use and in the method of placing and exploding them. In every harbor plans should be drawn up giving the position and power of every torpedo to be placed, so that they could be properly and efficiently planted at short notice, ready to use the moment a hostile vessel entered the harbor. This information should be kept in a secret book under lock and key and be accessible only to the commanding officer and confidential staff officers. With these precautions the danger of a *coup-de-main* from a hostile fleet would be very considerably lessened and possibly obviated, thus gaining us the much

needed time for perfecting our defenses still farther and organizing our armies; besides compelling the enemy to land his invading forces at places of secondary importance, from which their movements would necessarily be so much slower, as to still farther increase our *time*.

THE NAVY AND TORPEDOES.

The efficient means, therefore, of averting the dangers of a sudden war are a formidable navy and a perfected torpedo system for each harbor.

As has already been stated, our present land defenses are practically worthless. There is not a fort in the country which could withstand for any length of time the fire of the heavy guns of an iron-clad fleet and, what is worse, the inside of these forts would be more dangerous for the defenders than the outside. This state of things might be remedied to a certain extent, at some points, and thus relieve the Navy of a portion of its herculean task in defending our harbors. For this purpose we should "fight the Devil with fire" by establishing, in favorable positions on shore, the same kind of turrets and heavy guns which have proved so formidable afloat. Earth-works and masonry walls are soon knocked to pieces by modern artillery, but iron turrets (revolving by means of concealed machinery), and nature's hills will sustain an indefinite amount of the hardest pounding.

Revolving turrets armed with guns of the heaviest calibre should be placed at suitable points near the entrance of harbors. The machinery to work them can be better protected than it is on board ships. With high ground behind, a perfectly protected tunnel will give access to the machinery and guns to the working force from the army which lies in a comparatively safe position on the high ground beyond, on some such plan as is roughly sketched above. One such turret at the Narrows in New York Harbor, supplemented with a few good torpedoes, would do more for the protection of the city of New York than all the tiers of guns provided for at that point. Experimental turrets should be provided as soon as possible and in a few cases placed in position and tested. The form and dimensions of the model turret being once established and its efficiency demonstrated, others could be manufactured, placed in position and supplied with guns from time to time as our necessities required. The

engineer department should select *now* the positions where, in an emergency, such structures should be placed.

ORGANIZING ARMIES.

Having provided for keeping the enemy at a distance as long as possible, we must now look to what is necessary to be done in the way of providing means of effectually resisting the invading forces, which, if the war is to be a serious one and the conflict not confined exclusively to naval forces, must come sooner or later.

This brings us to the more purely military part of the subject, and the question must be met, practically, whether war actually comes to us or is only seriously threatened. For a threatened war would set the whole country on fire, and in the tumult of excitement we should all be at sea unless some system had been devised beforehand for *mobilizing* our fighting forces.

Thanks to our extensive system of railroads, traversing all parts of the country, our large manufactories of every kind, and our stupendous agricultural products, the question confronting us is not as formidable as it otherwise would be. These three elements of strength preclude the idea that *any* force from abroad—even the largest that the available transportation of the world could bring—could ever succeed in obtaining possession of or permanently hold any considerable portion of our widely extended country.

Our little army of 25,000 regular troops has often been termed a *skeleton*, and such it is. Let us see if by any device we can fill out this skeleton, furnish it with flesh, blood and muscle and make of it a good, hard-fighting body of adequate strength.

A great deal of the success of any plan to attain these objects will depend upon whether or not the war in which we engage is a popular one, and sometimes, even in the most popular wars, the demands of patriotism are not met as fully as they should be. To be obliged in the midst of a great war to resort to either heavy bounties or a draft would be both risky and unfortunate.

MEN AVAILABLE FOR WAR.

A country, in case of need, is entitled to the services of every able bodied man within certain limits.

Men available for military duty should be classified and made

amenable to service. By section 1625, R. S., it is provided that every such man between eighteen and forty-five shall be enrolled in the militia. It is thought that eighteen is too young an age to be established by general law. The age of twenty-one is preferable, and is advantageous in this that it is the legalized coming of age and the age at which men are qualified to vote. Hence the registry list for elections would furnish an excellent basis for the classification. On the first of January of each year, every man who has become of age since the preceding January should be placed on the list of "availables" for that year and designated "class of 189-," etc. In a few years every man available for military duty would know his class and, in case of war, when he would be called on to join the ranks. So long as the ranks were kept full by volunteering there would be no need to call men from the yearly "classes."

Without some arrangement of this kind, made *beforehand*, the country would be very much at the mercy of an invading army. In case of need such portions of these classes as were required could be rapidly assembled at designated railroad centres. The last census shows that more than half a million of men become of age yearly. Of course many of these would be exempt from military duty on account of physical disabilities. Within a specified time after the first of January (say three months) the case of every man to be so exempted should be examined and passed upon by medical boards. In this way the status of every man in the yearly class will be established beforehand, and with the exception of the comparatively few, who may become physically disqualified afterwards, the actual number to be depended upon in case of war will be known. From these yearly classes a specified percentage should be designated for active military duty when required, and individuals could be designated by lot.

Here is the material, how can we best make use of it?

FUGLEMEN.

In drilling regiments it is a very common practice to make use of "fuglemen." These are well-trained and drilled men who are placed well to the front where their trained movements in going through the manual of arms can be perceived, rather than seen, by every man in the ranks. These instinctively conform their movements to those of the fuglemen, and thus attain proficiency and uniformity in drill.

It is a well-known fact with military men that new recruits thrown into intimate relations with old soldiers, even in an active campaign, become rapidly affiliated with the veterans, and soon become efficient soldiers.

The Regular Army, then, should be used as "fuglemen" for the more numerous new forces. How best to do this, and obtain the best results, is a question which can be fully answered only by experience.

Hence only general plans will be outlined, with the hope that some of the suggestions may serve as starting points for future operations.

A regular regiment should be sent into a specified district composed of one or more States, its whole organization, officers and men to be used in organizing, drilling and equipping the militia forces. One company of regulars in a regiment of militia would be of immense advantage to the whole organization, not only as a standard and example to the inexperienced soldiery, but in the more active task of practical drill and discipline. This will interfere in no way with the constitutional provision for the appointment of the officers by the respective States.

In this way a single regiment of infantry, of ten companies, could be made use of to rapidly organize, discipline and drill, five or ten militia regiments according as one or two companies were assigned as "fuglemen" to each regiment, and ten such regiments would prepare for field service 100 regiments of militia, or 25 brigades of four regiments each. Artillery and cavalry regiments, having 12 companies each would furnish a larger number. If the whole of all arms of Service were to be used in this way, the result would be 430 regiments of militia, or $107\frac{1}{2}$ brigades of four regiments, or a little less than 36 divisions of three brigades each. The companies of the Battalion of Engineers could, at the same time, be used in organizing and instructing engineer troops.

When this organization is completed and the forces divided into brigades and divisions, the regular troops, under such of their officers as had not been absorbed with the militia, should be consolidated into brigades and used in the more extended instruction of field operations.

In inaugurating this plan for organizing a force to take the field, the regiments of militia, already existing as drilled and disciplined bodies, would be of vast importance as a nucleus around which to form other regiments. If these were not at once filled up

to the standard by volunteers, then, and only then, should the classified men be resorted to to fill up the ranks.

Congress might establish the order in which the yearly classes should be drawn on, or the matter might be left to the Executive. It is thought the best order would be to call on the last class first, and exhaust that class in any particular State before the next class is drawn upon. A substantial bounty should be provided for in advance for all *volunteers*, so as to have as large a number as possible enter the service voluntarily, and all the pensions of the future, as well as all other government benefits, should be confined to those who volunteer, except in the one case of disability resulting from wounds received in battle.

WARLIKE SUPPLIES.

Whilst the "mobilization" is going forward and the Navy and torpedo system are engaged in keeping the enemy from gaining a foot-hold on our coast, every arsenal and factory in the land would be engaged in turning out warlike material, such as guns, rifles, ammunition, tents, harness, wagons, and equipments of all kinds, whilst horses and mules, hard bread and bacon and other articles already on the market would be purchased. Depots for all these should be established at certain transportation centres not too near the frontiers. To these the stores should be forwarded as soon as completed, to be received at the depots and systematically stored ready for issue by staff officers of the supply departments, and it is safe to say that by the time the troops were ready for them, the supplies would be on hand, ready for issue.

DEPOTS OF SUPPLIES.

These depots of supplies should be of a two-fold character: depots for the equipment and provisioning of the forces first needed for active operations, and those larger, more important and more retired ones, intended to equip and supply a *reserve* force; for the proposed system necessarily requires the organization of a strong reserve to be used, like a reserve on the field of battle, at the critical moment, to replace a disabled army and check the triumphant advance of a victorious enemy.

IMMEDIATE AND ULTIMATE EFFECTS.

Under the last of the three heads into which the subject has been divided, there is but little to be said. Whether preparations

were made beforehand or not, the *immediate* results, in all human probability, would be of the most trying and humiliating character to the nation; for organization, discipline, drill, and military efficiency *must* always prevail against a force without these essential requisites, no matter how courageous the individual members of it may be. Tried by the stern requirements of war, a free, independent and brave people will not require a *very* great length of time to rally from disaster and recognize the imperative necessity of supplementing individual bravery with those elements of military efficiency which all history and every military man of experience recognize as so essential to military success. Hence the greater need to make, beforehand, such preparations as *can* be made; for the greater the preparation made the less trying and humiliating will be our first defeats. In the consideration of this point it must be remembered our enemy, whoever he is, is going, if possible, to so time his blow as to strike us in our most vulnerable point—the weakest joint in our armor. Our unprepared condition, our institutions and the time of our periodical elections are known to all the world, and should hostilities commence on the eve of a presidential election, whilst it was going on, or during the four months' period between the election and the inauguration of a new administration, the first blows, in the absence of any preparation, might be so powerful as to practically place the country at the feet of a powerful antagonist, and render it a serious question as to which was best, to yield to his immediate demands, or run the risk of increasing them by our struggles to recuperate.

It may be safely asserted that *now* every American would declare that there could be *no choice* between two such alternatives, and that the whole country with one voice would pronounce for war to the knife. But it is easy to make good shots when "the other fellow" has no pistol in his hand. War is a stern master, and unanimity of sentiment is not to be anticipated under the circumstances supposed.

Hence, again, *some* preparation *must* be made if we hope to escape dire humiliation and trials.

With some feasible preparations, the nation does not exist which could practically *conquer* this country, united as we now are by common institutions and common interests extending over the greater part of a vast continent.

It shall be my endeavor to demonstrate that such feasible

preparations can be made without endangering our free institutions, or shocking the sensibilities of any portion of our people.

CONSTITUTIONAL PROVISIONS.

The constitutional provisions on the subject are ample. *Congress* alone has power to declare war, and no appropriation for raising and supporting armies can be for a greater period than two years. In its hands rests the power to make rules for the government of the land and naval forces, to provide for calling out the militia, and for its organization, arming and disciplining and for governing it after it is called out. And it has also the power to make all laws necessary and proper for carrying into execution the powers given it, and the powers given the government by the Constitution.

In accordance with the power given it, Congress has already provided by law that every able-bodied male citizen between the ages of eighteen and forty-five, with certain specified exceptions, *shall be enrolled in the militia*. (Section 1625.) There are other laws on the subject which might with great propriety be amended or abolished, and some which might with great benefit be added. The section relating to the kind of arms and equipment (Section 1628) ought to be dropped out, or, if retained at all, the modern arms and equipments of the country should be substituted for the shot-pouches, powder-horns, *twenty-four* cartridges, "hangers" and "spontoons" therein enumerated. The arrangements provided for in sections 1630-31 and 32, so far as dividing the militia into brigades and divisions, and the appointment of a large number of general officers, might well be abrogated, and there does not appear to be any necessity of providing an organization for the militia, when called into actual service, different (sections 1645-46 and 7) from what it was before. The organization, equipment and pay should be the same as for similar troops in the Regular Army and in a single section can be comprised the provision for classifying the men available for military duty, as suggested in the first part of this paper, and for calling them into the Service, when occasion requires, to fill the ranks of existing organizations in accordance with the plan therein laid down.

Any plan for the organization of our forces should be pre-eminently a *practical* one, and I believe the main features of the one here proposed can be demonstrated to be practicable without

any new legislation and by simply exercising the power now existing in the War Department.

Already officers of the Regular Army have been detailed to inspect and report upon the militia organizations in several of the States. Judging from the results, the services of these officers are not only very acceptable to the State authorities, but are highly appreciated by the State militia.

Taking advantage of the proximity of U. S. garrisons, let a company or several companies be ordered each year into camp with the different encampments of the State militia with instructions to report for duty to the commanding officers of the militia camps to aid in organizing, drilling and disciplining the militia organizations. Care being used in selecting crack companies with competent officers, the results of such a step cannot fail to be beneficial, will demonstrate the practicability of the scheme proposed and will aid very materially in devising the details of the plan for the future. In this way the plan can be inaugurated gradually and in time be perfected.

Such details would be eagerly sought for by the most competent officers and be enjoyed by both them and their men. In many things the regular companies would be suitable examples for the militiamen to follow and, from personal observation, I am satisfied the regulars would find it profitable to observe closely and imitate some things they would see in the militia. The expense attending this plan in a few cases would be very slight. If found to work it could be gradually extended until every State in the Union could have the benefits of the presence of at least a company of regulars in its militia encampments each year, and we will then have made very considerable advancements in the direction of an organized, disciplined force which could be called into actual service on short notice.

When this plan is perfected, every regiment in the Regular Army will have "a local habitation and a name," and when the time came each would know exactly where it was to go, what it had to do and with whom it had to do it.

The best time to inaugurate this plan is *now*. The remarkably creditable display made by the militia force concentrated in New York during the recent centennial celebration, demonstrates what can be done in the face of great drawbacks, and gives promise of the most satisfactory results following a more general and systematic organization.

To those disposed to protest against making preparations to meet a highly improbable contingency, it might be said the contingency is *not* highly improbable, nor indeed *as* improbable as have appeared any of our wars just before they broke out. To any one who does not persistently shut his eyes to the facts, the loss of life, the human suffering, and the enormous waste of money and property consequent upon a lack of preparation, are evident to even the most short sighted. We may well reflect that without converting the whole nation into a military camp we may properly give heed to the warning of wisdom which counsels us "To prepare for War, in time of Peace."

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MACKENZIE'S LAST FIGHT WITH THE CHEYENNES: A WINTER CAMPAIGN IN WYOMING AND MONTANA.

BY CAPTAIN JOHN G. BOURKE, U. S. A.,

THIRD CAVALRY.

IT may be a matter of interest to many readers to learn something of one of the most decisive encounters with bold and daring savages in which the soldiers of the Regular Army have ever been engaged; one in which the fierce, brave Cheyennes were humbled and their power shattered.

To avoid prolixity, and at the same time to present all that may be essential to a clear understanding of the situation, it is proper to say that in the war which began in the winter of 1876 between the United States Government on the one hand and the two tribes claiming an interest in the possession of the Black Hills of Dakota, on the other, the Cheyennes had been the more determined, more fierce and more resolute, although the Sioux furnished by far the stronger contingent, numerically considered, of the forces arrayed in hostility.

The operations begun in February, 1876, by the attack made by General Crook's forces upon the village of the Sioux chief, "Crazy Horse," on Powder River, Montana, and maintained throughout the ensuing summer and fall, by various large commands under Crook, Terry, Gibbon, Miles and others, had not been specially fruitful in satisfactory results. To be candid, in not a few points of view, the hostile Indians had had much the best of the argument. Custer's command had been destroyed, or paralyzed, and the engagements of the Lower Powder, Tongue, Rosebud, Little Big Horn, Goose Creek, and Slim Buttes, had at first view not been decisive. But a second examination would discover that the lines of destiny were drawing tightly about the doomed aborigines. Their supply of ammunition, formerly almost limitless, was now absolutely cut off. Their friends and supporters on the Reservation were cowed into good

behavior by the presence of large bodies of troops at the Agencies, by whom discipline was enforced of a stern, but just and salutary nature. "Red Cloud" and "Red Leaf," prominent Sioux chiefs, who, during the summer, had made no concealment of sympathy with their brethren on the war-path with "Crazy Horse" and "Sitting Bull," had been surrounded at the early dawn of a frosty October morning, all in their camps made prisoners, and every pony belonging to them seized and driven away.

Baffled and humiliated, they sulked in impotent rage, while the element in the tribe antagonistic to them gathered round the astute "Spotted Tail," listened to the counsels of General Crook and promised obedience and assistance to the Government whose rations they were eating. They kept their promises to the fullest extent. Hundreds of young warriors enlisted as scouts, and when in the latter part of October, 1876, the different portions of our command were ordered to rendezvous at Fort Fetterman, Wyoming, every Indian on the Reservation, or on the war-path, and every officer and soldier knew that the end was nigh.

From the official description of Fort Fetterman the reader can see that, in the days of which I am writing, it was situated in latitude $42^{\circ} 49' 8''$ North, longitude $105^{\circ} 27' 3''$ West from Greenwich, on the south side of the North Platte River at its junction with La Pr  le (or Rush) creek. It was first established in July, 1867. The nearest stations on the Union Pacific Railway (Medicine Bow and Rock Creek), were eighty miles distant to the south, but as this "short" road was blocked with snow for nearly half the year, travel in the winter months followed the longer road to Cheyenne, 160 miles to the south-east, via Fort Laramie.

It contained quarters for three hundred enlisted men, and the necessary officers; the various magazines and store-houses required for the preservation of ammunition, rations and other supplies; a hospital with fifteen beds; stables for fifty horses; a corral capable of holding fifty six-mule wagons, with their animals; a theatre, an ice-house, a root-house, a granary, a bake-house, blacksmith shops, saw-mill, saddlers' shop, paint shop, laundresses' quarters and a steam engine for pumping water from the North Platte River.

Any ordinary map will show at a glance exactly where Fort Fetterman was, the different roads by which the columns con-

verged to that point, and the important part a military post played on the frontier.

The buildings had no pretensions to architectural elegance, being a single story each, of adobe, fronted by a veranda, but they served their purpose, were kept in good repair, were neatly painted and acted in a mild kind of a way as a Mecca for the first glimpse of which many a weary eye had strained its glance across the interminable plains between the Laramie and the Big Horn.

The expedition was composed of eleven companies of cavalry, from the 2d, 3d, 4th and 5th regiments, under command of General Ranald S. Mackenzie; four companies of the 4th Artillery, dismounted, and eleven companies of infantry, from the 4th, 9th, 14th and 25th regiments, under Colonel R. I. Dodge: the whole under the personal orders and supervision of Major-General George Crook.

Mackenzie, to whom the cavalry arm of the expedition had been assigned, was looked upon by the whole army as the embodiment of courage, skill and dash in an eminent degree. Impetuous, headstrong, perhaps a trifle rash, he formed a curious contrast to his self-poised, cool, silent commander whom the Indians of the plains and mountains from the British line to Mexico had learned to know and respect as the "Gray Fox."

Of the subordinate commanders and other officers, I cannot speak in detail; mention will be made of many in the appropriate places, but special reference in an article of this size and scope is impossible.

There was one comrade (much against his inclination, an absentee), of whom we often spoke kind words; Thaddeus H. Stanton, Colonel in the Pay Department, who had during previous campaigns handled the half-breed and full-blood auxiliaries, with courage, intelligence and skill. He never knew what it was to growl, never lost his temper, was at all times good-humored and helpful, full of story and reminiscence, a capital soldier, one of the best fellows in the Service, more like one of Charles O'Malley's dragoon companions than any one I've ever met, but extremely modest in referring to his own hard service, which he seemed to think was a matter of course. I should like to mention, were it possible, the good qualities of every soldier: Words of praise from me to individuals, however, would scarcely be possible, but I can surely be permitted to laud them in the aggregate.

gate and say in words something like those of Tiny Tim : " God bless them, every one."

The total effective strength of the expedition was, in round numbers, fifteen hundred officers and men, including a medical staff of six surgeons. This was of white troops only ; but our Indian auxiliaries, in whose praise too much cannot be said, aggregated not quite four hundred more, divided among Sioux, Arapahoes, Shoshonees, Bannocks, Pawnees, and, most important of all, a few friendly Cheyennes. The Crows in the Judith Basin, in northern Montana, sent word that two hundred of their best warriors would start under Major Randall, to combine with the expedition at or near Pumpkin Buttes, or old Fort Reno ; " Spotted Tail " expressed his willingness to allow as many more of his young men to enlist, if required, and the Winnebagoes, friendly for many years, applied through their agent for permission to send a company to take part in the campaign.

The military plans may be outlined in one paragraph. With the Indian scouts scouring the country in front, flank and rear, no trouble was to be expected in locating the villages of the hostiles ; then the cavalry under Mackenzie could be pushed forward to strike a sharp, decisive blow upon anything not beyond its ability to handle, or, failing in this, could fall back upon the infantry following more slowly in its trail. To supply a column of this size, in the depth of winter, was a problem demanding most careful consideration. There was a train of one hundred and sixty-eight wagons and seven ambulances, with two hundred and nineteen drivers and attendants ; and a pack-train of four hundred mules cared for by sixty-five expert packers, to follow after the cavalry whenever it should cut loose from the main body.

No finer, cleaner-cut expedition was ever known in the annals of the Regular Army. A large percentage of the rank and file had been taught the stern lessons of Indian warfare in the movements of the two years preceding and could take care of themselves under any and all circumstances. Every man was provided with a fur cap, fur gloves, fur leggings and felt boots, or else the ordinary cavalry boot with Arctic " snow excluders." Three blankets were allowed each soldier, besides an overcoat and tentage (so long as with the wagon train).

Company K, 2d Cavalry, under the gallant " Teddy Egan," (long since dead) was detailed as Provost Guard at headquarters,

to supply mounted couriers and mail carriers when needed, attendants upon the "travois" carrying the wounded, and other valuable duties of a kindred type.

The Indian scouts were divided into detachments of suitable size, dependent upon tribal relations, commanded by Lieutenants William P. Clark, 2d Cavalry, W. S. Schuyler, 5th Cavalry, Hayden Delaney, 9th Infantry, and Major Frank North, the last named so well known from his years of association with the Pawnees.

The Indian scouts were a superb lot of men, physically and mentally. Those who impressed me most were "Sharp Nose," chief of the Arapahoes, "Li-heris-oo-li-shar," or "Leading Chief," of the Pawnees, "Tupsi-paw" ("The Rag-picker") of the Shoshonees, and "Three Bears" of the Sioux; but in my long list of names, I discern those of such doughty warriors as "Pretty Voiced Bull," "Yellow Shirt," "Singing Bear," "Lone Feather," "Tall Wild Cat," "Black Mouse," "Charging Bear," "Feathers on the Head," "Fast Thunder," "Keeps the Battle," "Kills in the Winter," "Lone Dog," "No Neck," "Rocky Bear," "Six Feathers," "Sorrel Horse," "Horse Comes Last," "White Elk," "Bad Moccasin," "Fox Belly," and "Red Leaf."

Association with their white comrades soon begot a friendly intimacy under whose tender impulses names were exchanged, as in the case of Lieut. Charles Rockwell and others. Rockwell was our Commissary and a brighter or more efficient one never was known. The Indians saw plainly that a man who had absolute control over such immense quantities of bacon and sugar and coffee must rank very close up to the Great Father himself, so they made the friendliest overtures, offering to exchange not names alone, but clothes as well. Rockwell accepted the agnomen of "Six Feathers," but drew the line at the clothing business.

Only those who have known by actual experience, can appreciate the responsibility and labor entailed by the hurried organization of such an expedition, at any time and in any place, but more particularly when the time is an Arctic winter, and the place Fort Fetterman, Wyoming.

From the first sound of reveille in the morning until long after taps had hushed the worn-out troopers to rest, there was hurrying and scurrying worse than had ever been seen on Canoby Lea; all was movement, animation and activity. Heavily-laden

wagons rumbled along the roadway or gathered in canvas-covered column, to discharge cargo or to reload at the Commissary ; here and there stood the caparisoned horses of officers and orderlies, showing the location of the offices in which business was transacted. Sentinels paced with monotonous cadence their weary posts of duty ; a battery of cannon, covered but not concealed by paulins, and the evening parade of the companies with their well-dressed alignment of disciplined stolidity were suggestions of military precision in high relief from the hurly-burly and apparent disorder surrounding them. Groups of blanketed, painted, savage allies gazed impassively on the treeless, ice-locked channel of the Platte.

Far away to the distant horizon, the white-mantled terraces, extended in ridge upon ridge until they touched the hems of the leaden robes of cloud the sky had just doffed. Flocculent masses of vapor, like Golden Fleeces in an ethereal Pactolus ;—brilliant carmine and bronze patches straggling across the dome, catching the last reflections of the sun going down behind the Western mesas ; amber tinted zones, interspersed with steely-blue stripes resting upon the receding strata of snow-clouds ;—were negligently mingled in a combination of rare beauty, in whose contemplation the weariness of official routine was almost forgotten.

The sharp boom of the evening gun signalled the descent of the sun ; slowly the golden tints of the clouds changed to bronze, to carmine, to a dull red ; this last turned into a pale yellow blending imperceptibly into the darkness of night, relieved by myriads of sparkling stars.

The atmosphere in its purity gave free passage to every beam of light, or re-echoed the slightest sounds. Only the crunching of feet trampling the crisp, crystalline snow, or the barking of some shadow-scared hound, relieved the stillness. It was Night in Wyoming and Winter had begun.

At last all was ready : the last ration had been packed away, the last cartridge issued and stored in belt, the last mule shod. The last official communication had been written ; the last report exacted by red tape had been consigned to the post-office for transmittal to the mausoleum in the pigeon-holes of the War Department. The last requisition had been signed, countersigned, or returned to be properly briefed. For the last time, weary and eyesore aides-de-camp had had the honor to acknowl-

edge receipt of correspondence from Colonel A. and Major B. and Captain C., and to assure those estimable gentlemen that they were their very obedient servants; and for the last time the combined and pent-up ill-humor of the whole military establishment had burst with cyclonic wrath upon the devoted head of Major Furey, our efficient and amiable, that is usually amiable, quartermaster. He had been hauled over the coals by the general commanding, growled at by the battalion commanders, sneered at by the captains and damned by the lieutenants until patience had ceased to be a virtue and poor Furey assured me (during a lull in the storm of objurgation about midnight, while I was mixing him a little paregoric and hot water, or something like that,—my notes are a trifle blurred at this point and I can't clearly make out what it was,) that if he ever lived through the campaign he intended to resign from the Service and set up in business as a pirate, anything, rather than be a quartermaster another day. However, he seems to have reconsidered this determination, for his name is still borne on the Register.

There were councils and councils, never-ending councils with the Indians, but even these too, had an end, and on the 14th of November, 1876, the old familiar road to Fort Reno stretched out in a long, snaky line over the low bluffs to the Northwest, as the column began picking its way through the floating ice across the North Platte.

The scene was certainly most picturesque and full of animation; everything moved like clock-work. Each man, horse, wagon and mule was in proper place and the crossing was effected without difficulty, the volume of water at that season being scant and the current sluggish, a pleasant variation from the turbid, swift-rolling torrent which had carried away the ferry-boat when the transfer was in progress the last spring and hurried several teamsters with their horses to graves beneath its waves.

From the North Platte crossing to the then remote outpost of Cantonment Reno on the Powder River at the foot of the Big Horn range, is not much over ninety miles and was made by easy marches in four days.

Of the intervening country, not a great deal can be said; it is "high-rolling mesa," fairly well grassed, with some cottonwood growing along the courses of the insignificant streams, which are not worth the trouble of a description. The water is frequently vile and is never good until you get up to the Piney, one of the

forks of the Tongue, just beyond Reno, where trout may be found in considerable numbers and of good size.

Buffalo had formerly roamed over it, but in 1876, had retired over towards the Rosebud, a considerable distance to the West. Antelope were still to be found in great herds, and my note-books recall to my recollection a very grand picture of a party of Indian scouts chasing a band of these fleet-footed coursers of the desert and shooting them down on the dead run.

So far the campaign had been without incident. There was nothing to talk about while marching and, even had there been, conversation would have flagged because your old soldier is a taciturn, grumpy animal on the march, not much given to an expression of opinion on any topic.

My personal inclinations led me to associate as much as possible with our savage scouts, whose modes of life, language and religious thought were always of an indescribable interest. Nearly all the talk I had with anybody was with them and the result was the enrichment of note-books with references to aboriginal customs in war and peace which probably could not have been obtained under circumstances of greater advantage. The American Indian is by nature so secretive and reticent that unless one by long personal association learns how to watch and extract information, much of what may be called his inner life, would inevitably be lost.

These Indian scouts covered the country for thirty to forty miles on each side of the column, letting nothing escape their scrutiny, but keeping their own movements well concealed. A party of them came upon three horse tracks shortly after we had left Sage Creek and followed them for a day, overtaking the riders, who proved to be white men, but whether pony thieves or "prospectors" they could not determine.

Part of the time we marched in the teeth of a biting storm of snow, and at every hour of the day the sun could be discerned sulking behind soft grey mists in company with rivals, known in the language of the plains as "Sun-dogs," whose parahelic splendors warned the traveller of the approach of the ever-to-be-dreaded "blizzard."

Cantonment Reno was not at that time suggestive of luxury or comfort: officers and men were living in holes excavated in the faces of clay-banks, or in make-shift quarters of similar type. It had been re-established for the protection of supplies to be issued

to expeditions like our own, and answered its purpose well enough. The officers and soldiers of the garrison were taking things philosophically and there was no growling or complaint of any kind. Still, an order to report for duty at West Point, or New York, Fort Monroe or Washington would, I fancy, have been received with gladness and obeyed with alacrity by most of them.

More unaffected hospitality couldn't be found anywhere in the world. It's a very strange phenomenon in human nature that a lieutenant who has only two blankets, and neither of them any too good, will become fighting mad and want to shoot the visitor to his post who will not accept the use of one; but let the same fellow marry a rich girl and go to live in a "cottage" in Newport, with seventeen spare rooms to it, and his own brother may make himself as comfortable as he can in the gutter. It may be the fault of human nature, or it may be the fault of the girl; perhaps, of both, but it's a queer thing, anyway, and I, for one, can't understand it.

I anticipated a trifle when I spoke of the Shoshonee Indians being with the column, which they did not join until it reached Reno, where they were awaiting it, over one hundred strong, under command of Tom Cosgrove, an old acquaintance and an old frontiersman, and the sons of their head chief "Washakie."

We remained at Reno only long enough to let the blizzard expend its fury; the days were not wasted, however. The commanding general (Crook) assembled all his Indians and laid down to them, in a few well-chosen words, rules for their guidance during the campaign. He emphasized the fact that all these vast plains, all these mountains and valleys would soon be filled with a pushing, hard-working population, the game would be exterminated, domestic cattle would take its place, and the Indian must make up his mind, and make it up now, to live like the white man and at peace with him, or be wiped off the face of the earth. Peace, the white man wanted. War he was prepared for. He wanted to impress upon his hearers the great fact that law was not tyranny; people who obeyed the laws were those who had the largest amount of liberty. It was not the white man, but the Indian who was afraid when he went to sleep at night that he and all his family might be murdered before morning by some prowling enemy. They were going to get good pay as soldiers, and so long as they behaved themselves, and so long as he could

find work for them to do, they should be soldiers, but they must not spend their pay foolishly. Save every cent of it and buy cows and mares. While the Indian was sleeping the calves and colts would be growing and some day he'd wake up and find himself a very rich man and then he'd be ashamed to call upon the Great Father for help. At this talk he saw before him representatives of the Kiowas, Blackfeet, Nez Percés, Cheyennes, Sioux, Arapahoes, Pawnees, Utes, Shoshonees, and Bannocks. What he said applied to them all. This was a good time to bury the hatchet and reconcile petty differences. Indians should be friendly to each other as well as the white man. One word more. When they came upon a village of the hostile Indians they must be careful not to kill women or children, as he was determined to make an example of any one caught disobeying this order.

The Indians listened attentively, and as sentence by sentence these remarks were translated by the interpreters or expressed in the sign-language, a chorus of Ughs! and grunts of approval passed from the inner circles to the outer. The greater portion of the Indians appeared in their new uniforms, yet a few sported magnificent war-bonnets of feather-work and other regalia. Responsive remarks were made by "Tup-si-paw" and "O-ho-atay" for the Bannocks and Shoshonees, "Sharp Nose" for the Arapahoes, "Three Bears" for the Sioux, and "Li-heris-oo-li-shar" and "U-sanky-su-cola" for the Pawnees.

"Li-heris-oo-li-shar" ("Leading Chief"), of the Pawnees, was determined to make the most of the occasion and impress upon the other Indians that he was nothing more or less than a white man, determined to "follow the white man's road."

The hand was the hand of Esau, but the voice was the voice of Jacob; his clothes were all right, a suit of Chatham Street "hand-me-downs" obtained from the munificence of the Interior Department during a visit to Washington; his face-painting, however, would not be justified by any of the canons of good taste inculcated by Ruskin or Whistler. Eye-lids and ears, and the median line of forehead and chin, blushed with vermilion; the cheek-bones were stained a dark brown, and the lower half of the face a dirty lemon. The hair was divided into two pig-tails, wrapped in yellow tape and hanging over the ears.

That night (November 19, 1876,) a degraded wretch was caught selling whiskey to soldiers and Indians; his cart was confiscated and the heads of his barrels knocked in,—a punishment

utterly inadequate, as we were obliged the next day to consign to the grave a poor recruit who, under the influence of this vile liquor had wandered off in the snowy blast and frozen to death.

While the storm was at its worst, a detachment of Indian scouts, fourteen in number, (eight Arapahoes and six Sioux) were dispatched on a reconnoissance in the foot-hills of the Big Horn to the West.

The storm abated somewhat before day-break, but all of November 20th there were rough, cold gusts of wind from the north and north-west and occasional "flurries" of snow, but not enough to prevent our red-skinned auxiliaries from holding a delightful series of peace-talks, smokes and dances, in which there was mutual serenading, plenty in quantity, wretched in quality, some present-giving and protestations innumerable of the most affectionate friendship. Had I space, I could fill pages with descriptions of the curious customs brought out on these occasions, and will at an early day crave the attention of my readers while I relate them, but just now we must hurry on to other scenes.

Thirty-four miners from Montana reached Cantonment that day. They were almost starved and had narrowly escaped death in the blizzard. Rations were supplied them and all that the means at hand would permit was done for their comfort.

The reconnoitering party of fourteen Indian scouts whose departure was recorded a day or two back, returned, bringing with them a prisoner, a young Cheyenne warrior, who, seeing them dressed as his own people (they had taken the precaution to leave all military trappings behind), had mistrusted nothing until they had seized and bound him and started back on their long, cold ride of fifty miles to rejoin the main column. He was taken to headquarters, where cross-examination elicited the fact that he was one of a small party living in five lodges near the head of the Crazy Woman's Fork and that if they became alarmed, as they might by his failure to return, they'd surely break across the country to join "Crazy Horse," who was encamped close to our battle-field of the previous June, on the Rosebud, Montana.

The blizzard resumed its fury and the ground this night was covered deep with snow. We didn't mind that much, looking upon it as a benefit rather than a misfortune, because it would give all the better chance of drawing close to the enemy without discovery.

We were to start in the morning, prompt and early, so

all hands were busy in scratching off a line to some of the folks at home: the mail was soon ready, and with the dispatches of the only correspondent who succeeded in catching the command before it started from the railroad—Mr. Roche, of the New York *Herald*—a companionable, scholarly gentleman, who has since abandoned journalism and become possessed of considerable means in Texas,—was securely wrapped and tied in an oil-silk envelope and given to the courier, whose prompt, hearty “Good night, gentlemen,” was uttered at the same instant with pull of rein and dash of spur—and in a moment more, he had disappeared in the gloom, to fight his way, as best he might, through snow and sleet, cold and danger of all kinds, back to Fort Fetterman, ninety miles.

A few remarks touching the principal Indian chief accompanying us may be of value.

“Sharp Nose,” of the Arapahoes, was tall, straight, of large frame, with piercing eyes, Roman nose, firm jaws and chin and a face inspiring confidence in his ability and determination. His manners were dignified and commanding, coming nearer to the Fenimore Cooper style of Indian than any I had seen since my visit to “Cocheis,” the renowned chief of the Chiricahua Apaches, in the Dragoon Mountains, Arizona, in February, 1873.

“Li-heris-oo-li-shar,” the Pawnee, had a good face, prominent cheek bones, aquiline nose, large mouth and frank, open eyes, not so piercing as those usually to be noticed among the aborigines. He had the air of a far-seeing, judicious law-giver, one who took note of all he saw and whose advice could be relied on. Yet, he was no lamb, as the outlines of his countenance plainly showed that, if aroused, he would be a bad enemy.

“Tupsi-paw” and “O-ho-a-tay,” of the Shoshonees, were crafty old rascals, without much sentiment or romantic imagination lighting up their features.

“Three Bears,” of the Sioux, was young in years, but mature in thought. He looked, as he was, a man whose friendship could be relied on. He made no pretensions as a speaker and cut but a poor figure in declamation, when “Sharp Nose” was in the same council. His power as a commander depended more upon the success to be won from stealthy movements and crafty combinations than from any lion-like attack such as “Sharp Nose’s” face suggested he might make.

On Wednesday, November 22d, 1876, we moved to the

Crazy Woman's Fork of Powder River, about twenty-five miles from Cantonment Reno; on the banks of that stream at a point where good water, grass and fuel were to be had in abundance, and where an extended view of the surrounding country made surprise difficult, the supply train of wagons was ordered to park and remain, with a strong guard, under Major Furey, the quartermaster. Ten days rations were packed on mules, one hundred rounds of ammunition issued to each man, and all preparations made for swinging loose for a march in search of "Crazy Horse's" village.

During this afternoon, the Indian scouts killed three buffaloes and brought the meat back to camp; this wasn't, by any means, the last time that I saw buffalo on the plains, but I make allusion to the fact as the great herds have now entirely disappeared.

I have just said that General Crook's intention had been to push out from the "Crazy Woman" and strike the camp of the great Sioux chief "Crazy Horse," believed to be then on the upper Rosebud, Montana, near our old battle-field of the previous June. This plan was changed by a trifling circumstance.

Shortly after dawn on the morning of November 23d, a white flag waved from the crest of a bluff in the vicinity of our camp. It was borne by "Sitting Bear," a Cheyenne Indian, who had been dispatched from Red Cloud Agency by Col. J. W. Mason, in advance of the expedition, to bear an ultimatum to the hostiles and ask them to surrender without bloodshed. He was soon at headquarters, with the important information that the capture of the young Cheyenne warrior had alarmed his village, which had started across the hills to join "Crazy Horse." There was, however, he understood, another Cheyenne village, an extremely large one, hidden in the cañons of the Big Horse range near the sources of the "Crazy Woman" the very stream we were on.

To determine the location of this village, to surprise and destroy it, was, in one word, the order of the day. General Mackenzie was ordered to take the Indian scouts and all the cavalry, but one company, and push up the "Crazy Woman's" Fork to its head, and then strike in to the Big Horn mountains and hunt for what fate might have in store for him. All told, Mackenzie had an effective force of exactly eleven hundred officers and men, one-third of the number being Indian scouts. The infantry and artillery companies, and one company of cavalry, the last reserved for employment as couriers and mounted work generally, were

to follow as promptly as possible on the trail of the first division.

Preceding all, by eight or ten miles of distance, was a very small detachment of Indian scouts, selected with special reference to their knowledge of this particular section of country, coolness, good judgment and experience in war.

There are few sights more inspiring to a military observer than a compact, well-disciplined column of cavalry, "fined down" to a minimum of impedimenta, moving rapidly, silently and with malice aforethought along the trail of an enemy. Especially is such the case when the march is made in the depth of winter, in a flurry of snow, by day or by night, when the fur-clad veterans, gleaming from head to foot in an additional coating of crystal rime, and with heavy beards matted with the ice of frozen breaths, bring back to recollection all the childhood legends of Santa Claus and Jack Frost.

Closing well up on the rear of the column followed the pack-train, each mule and packer selected after an examination alongside of which the severest tests of our much-vaunted civil service seem trivial; but an examination whose rigor will commend itself to all who reflect that upon the absolute, undoubted efficiency of every man and mule depends the celerity and promptness with which the ammunition, rations and blankets of the command are to reach camp each night.

No officer of the United States Army has given the earnest, intelligent attention to the subject of pack-mule transportation as has General Crook; he may, without qualification, be called the apostle of the military pack-train. He recognized the importance of this branch of study, made it his own from Alpha to Omega, introduced military promptness and discipline into the system already prevailing, and had the gratification of seeing his severe labor rewarded by the success attending his campaigning in the mountains and on the plains. There is not a pack-train in the Army to-day which does not trace back its first organization to General Crook in Arizona in 1871, although many years prior to that he had run others on the same principles in Oregon and California.

I don't wish to travel out of my way into a dissertation upon pack-trains and their management; I will introduce only one remark to show with what care a first-class "train" must be organized. No mule, if such a thing can be avoided, will be accepted

by a train-master of experience, when the mouth shows signs of "bridle-wear"—that is, evidence of the animal having been so long used in harness that the constant tugging and pulling on the bridle have worn out the lips at their point of juncture.

The explanation given for this is easy enough to understand. Such an animal cannot slake its thirst half so readily as one whose mouth has not been injured, because much of the water it may take into its mouth while crossing a stream will escape at the sides. Time is nowhere so important an element as on military forced marches: the old pack-master knows that as well as does the oldest general, and therefore rejects, whenever he can, mules of the class I speak of.

The muleteers themselves must be strong, lithe, active, not afraid of hard work, and willing to take cheerfully the roughest kind of knocks. The pack-train is, from first to last, an exotic, imported in the early days of California mining from the Andean slopes of Chile and Peru; the packers whom I met in my first years of service were, with scarcely exceptions enough to emphasize the rule, natives of the two countries named, or of the western States of Mexico. They were a good-natured, merry-hearted set of fellows, ever anxious to render kind services and delighted beyond expression when they happened to run across an officer desirous of jotting down the tender words of their dainty Spanish songs of love disdained and unrequited. To form an opinion from the theme of almost every one of these amorous ditties, the Cavalier of Castilian origin would appear to be an individual of charming qualities of mind and person—one to whose pleadings the proudest and noblest lady should be glad to listen. His voice, his music, his earnest devotion, all, are thrown away upon the dark-eyed witch who lurks in the immediate vicinity of the lattice overlooking his position, but who deigns no sign of acquiescence or approbation. It may be a trifle late in the day for me, a foreigner, to express a withering contempt for this much lauded beauty, insensible to music of an entrancing type, and the occasion, I am certain, of many grievous cases of pneumonia and pleurisy, originating in the exposure of these serenades. I have waited for years, hoping to learn that she had something to say for herself, that there was a woman's side to this distressing story. None has come. All Spanish love-songs point the one moral, and I am, consequently, much against my will, forced to the conclusion that the Spanish lover is a greatly abused individual whom

I advise to turn his back upon the stony-hearted maidens of his fatherland and come to our own glorious country, where the sex is not so refractory.

The first-class packer was, invariably, I might say, a first-class cook, to whose courtesy and forethought I have been on many a cold, chilly night indebted for an invigorating cup of chocolate, or nourishing plate of "frijoles," dishes which are utterly beyond the grasp of our boasted American civilization.

The American is equalled by no people in the world for his ability to comprehend questions of constitutional law, to lay and construct railroads and to organize and manage, sometimes to wreck, great banking institutions; but when it comes to the business of catering to the inner man, he is as stupid and helpless as a baby. Were I to be called upon this moment to choose between a cup of chocolate and a plate of beans prepared by my old friends "Chileno John," or "Lauriano Gomez," and the same viands concocted by Jay Gould or Leland Stanford, I know what my decision would be.

Being indirectly of Spanish origin, it was to be expected that many of the terms used in pack-trains should betray their derivation. This was the case and has only begun to change with very recent years; the words "acémila" for "pack-mule," "macho," used almost in the same sense, "sencero" for "bell-mare," "atajo" for the pack-train itself, "cargo" for the load each animal was to bear, and "cargador" for the official whose duty it was to arrange and distribute these burdens, were as well understood by officers of the Army serving in Arizona and New Mexico in the decade from 1865 to 1875 as their English equivalents.

And this philological survival has an interesting historical significance. Often as I trudged alongside of the pack-trains and listened to "Long Jim" Cook, or "Jim O'Neil," or Tom Moore, or "Hank'n Yank," or some other American overseer or pack-master, as "he his descant wildly thus began," upon the merits of "that thar puss mule," or "you, Keno! you, Billy! g'lang thar," my mind would insensibly revert to the descriptions of the Siege of Grenada, whither Isabella the Catholic ordered the removal of her Court to the newly-erected city of the Holy Faith and brought together more than 15,000 mules to carry rations to her followers.

Every man keeps concealed in his inner heart a small but carefully selected package of vain regrets, which he takes out from

time to time, looks over carefully, and puts back in the arcanum. One of mine, I may here confess, has been the lack of occasion for stringing together all the incidents and adventures, buried in my note-books, in which appear the names of my warm friends, Tom Moore, Jim O'Neil, Hank'n Yank, Delaney, Young, Harry Hawes, Frank Monach, Daily, "Long Jim" Cook and "Short Jim" Cook, Charlie Hopkins, "Lauriano," "Chileno John," José de Leon, Vasquez, Castro, and dozens of other packers; Frank Gruard, Ben Clarke, Al. Seiber, "Big Bat" and "Little Bat" (*i. e.*, Baptiste Pourrier and Baptiste Changrau), Ben Roland, Frank North, Tom Cosgrove, Jack Crawford, and scores of white scouts and guides, not to mention those of purely aboriginal blood.

"Buffalo Bill" Cody and his devoted friend and servant, "Buffalo Chips" White, appear time and again in my pages, always at the front of danger; the former is now too well known to need a word of praise from me, and the latter, poor fellow, sleeps where he fell, not many feet from my side, in the fight at Slim Buttes, Dakota, September 9th, 1876.

My readers will kindly bear with me, I hope, for bringing in with special particularization old "Uncle Dick" Kloster, one of the pack-train veterans now dead and gone. As he presents himself to my recollection, he is clad from head to heel in fur and blanket-lined canvas, a musk-rat cap upon his head, while from eyes to breast depends a snow-white beard, matted like a board with frozen tobacco juice, because it was during the severe privations we underwent together in the campaign in Montana in the early months of 1876, when we were marching on half-rations, with the mercury frozen solid in the thermometer. Every afternoon, the moment the column made camp, out came my note-books, and the events of the day were recorded; in ink, until the severe cold broke the bottle and afterwards, as well as numbed fingers would permit, in lead pencil.

"Uncle Dick" would first look after his mules and then hurry to my side, doing everything in his power to add to my comfort. Sometimes, he would pile up "aparejos" (a form of pack-saddle) to keep the fierce north wind from carrying me away bodily; sometimes, build a fire at my feet, to keep my toes from freezing, but always something.

At last he unbosomed himself. He believed I was going to write a book, "as big as that thar Webster's Dictionary I seed

down to Luke Murrin's s'loon in Shy-an ;" no man could be taking all those notes for nothing, and poor " Uncle Dick," like many of better education, mixed up the two ideas of quantity and quality. He had been on the Pacific Slope, in the Rocky Mountains, in British America and in Mexico, since 1849, had had his own share of " ups and downs," but had never yet " seed " his name in print. Could I—would I—put his name in " the " book ?

When I told the dear old soul that not his name alone, but a full reference to his valuable kindness as well, should appear in a prominent page, the smile that spread over his face cracked the frost on his beard. " Look, Uncle Dick, here's your name, see for yourself." This recognition roused his generous good nature to a paroxysm of enthusiasm ; he multiplied his efforts and ventured every now and then to proffer bits of information, some of it of consequence and some not, but all received most gratefully. I overheard him once confiding to an open-mouthed packer, that " me'n the Cap'n air gettin' up a book 'bout Injuns'n mos' everythin'," and my last parting word from the old man was : " Cap, don't forgit that thar book outfit." No, Uncle Dick, I have not forgotten, and I hope you may be able to read these lines from the ' packer's ' Paradise, to which I am sure you have gone, and where your honest old soul would be grieved did you not find an abundance of grass and water for your mules, no flies to bother them, and the very best of rations for your men—beans and bacon, " yeast powder " bread, dried apples, coffee and chocolate and an occasional " snootful " of something to drive away malaria.

Mackenzie and the cavalry made a rapid march of twelve miles or more up the " Crazy Woman," passing over as fine a pastoral region as is to be found in the world, and then, upon the advice of the Indian scouts, bivouacked in a spot well hidden among the foot-hills of the Big Horn range, to which we had been drawing closer and closer all afternoon. Colder and colder became the night, the stars glinted pitilessly from the inner depths of the blue ether which are hidden from Eastern eyes, but the feeling that we were sure to have a fight of some kind within possibly twenty-four hours, kept blood in circulation and when an electric pulsation of steely gray flashed upwards from the Eastern horizon to herald the near approach of the God of Day, not a man or horse showed the slightest bad effect of the Polar temperature, a fact I recorded with much pleasure in my notes at the time.

We resumed our march as soon as we could discern the trail of our advance detachment which led in towards the Big Horn mountains, going a trifle west of south, as it had on the previous day, and through much the same kind of fine grazing country. For about three hours we moved as rapidly as the frozen ground permitted; the slippery, frost-mantled grass offered no serious obstacle, but we did find all we could do to cross the innumerable "cut-bank" dry beds of streams, every one of which had to be broken down into suitable slopes by which the animals could descend and ascend. The ground was every bit as hard as flint and took up a great deal of valuable time before it would yield to axe or pick, which it frequently broke. Many of these crevices in the surface were not more than fifteen or twenty feet wide, so that the great labor involved in their passage had all the appearance of an unnecessary aggravation of our discomforts. We were growling and grumbling not a little at these troubles when the advance scouts rejoined at a run, and from head of column to rear guard spread the magnetic whisper that the enemy's village had been discovered and was almost under our noses. From the information brought in by the Indian scouts General Mackenzie concluded to halt just where we were until the rising of the moon, and then move slowly and cautiously forward to attack the enemy at daybreak. Our Indians had noted carefully every foot of the way, both going and returning, and knew exactly where to take us. Besides this, two of their number—"Red Shirt" and "Jackass"—had remained behind, hidden among the rocks on the top of a high hill from which coign of vantage everything transpiring in the village below was distinctly visible. I think it only fair to make special allusion to this act of daring and good judgment, for the very excellent reason that many inexperienced and unthinking persons, military as well as civil, have allowed themselves to be drawn into the error of disparaging and depreciating the services of Indian auxiliaries; on this, as on every other occasion of my twenty years close observation of them, they were of the greatest possible help to our soldiery, acting with the whites or singly. As already indicated, they represented on this campaign many different tribes, some of them being Cheyennes, closely related to the people we were soon to fight.

"Red Shirt" is, I think, the same Indian who has within the past year or two accompanied "Buffalo Bill" across the ocean and been presented to her Majesty, Queen Victoria.

There was no shouting, no cheering, no loud talking to show excitement ; an old soldier would have known, however, that the news passing along so quietly and yet so swiftly from mouth to mouth was enough to set a civilian's blood on fire, he would have known it from the way men were looking at the fastenings of their saddle-girths and bridles, examining for the last time the action of breech-block and trigger, or making sure that no cartridge should be missing when wanted.

We didn't have very long to wait that short, hazy, bleak November day for the setting of the sun and the coming of our good friend, the moon. The grim bosom of the Big Horn Mountains parted to admit the column into a deep cañon whose vertical walls carved into turrets and battlements by the erosion of time and the elements, proclaimed almost with the eloquence of human tongue that those who entered must leave all hope behind.

Hidden by these lofty pinnacles, the coquettish moon played hide and seek, anon bathing the barrels of carbines and the metal work of bridles in an effulgence of light and again deserting us in darkness so opaque that the gentle glitter of kindly stars seemed to acquire the power of countless suns.

All night long we groped our way, floundering, slipping, struggling over smooth knolls of glassy surface, making the slowest kind of progress, but still advancing. Not a word was spoken above a whisper. Not a match was lighted, and the soldier's faithful friend, his pipe, was not allowed to leave the saddle-bags.

The most stringent orders were given that the column should keep "closed up," and each company as fast as it had worked its way across an unusually difficult ravine passed word to the front of its success and of the whereabouts of the company next behind it.

The Indian scouts manifested much greater anxiety than did their white brethren, probably because they understood the gravity of the situation better. They had calculated that the march to the hostile village could readily be made during the hours of night, but none knew better than they that there was not a moment to be wasted. If our attack could be made in the earliest hours of the morning, taking the enemy completely by surprise, the smaller loss should be on our side ; should delays overtake us and the light of the coming day disclose our approach to vigilant and awakened savages, the percentage of loss upon which we might reasonably count was to be reckoned only by the

amount of ammunition the hostile Cheyennes would have to expend in the contest.

So closely was our attention occupied by the task of working a way across the precipitous ravines which seamed and gashed the bottom of the cañon adown which rippled over its rocky bed the waters of the stream, called, as best we could determine, Willow Creek, and which on account of this same rippling were not frozen into solid ice—that our dull ears did not seize upon the ominous thumping of the Cheyenne war drums faithfully but feebly re-echoed by the towering walls which hemmed us in. Not so with the Indian scouts. Their faces might remain stolid and impassive, but every movement of muscle and sinew betrayed a frenzy of suppressed excitement.

One of them nudged me with his elbow and then pointed with his lips up the cañon in a way peculiar to savages. There was no doubt of his meaning; we were within rifle-shot of our quarry, but he wasn't asleep, as we had hoped to find him, but in full possession of his senses and dancing a great War-dance, in celebration of some recent victory. We threw ourselves on the ground and then heard with startling distinctness the thumping of the drums, the sleepy intonation of the tired out "medicine men" and warriors and the patter of languid feet. The dance was almost over, but the dawn had almost come.

(To be continued.)

MOUNTAIN ARTILLERY.

BY FIRST LIEUT. C. D. PARKHURST, U. S. A.,

FOURTH ARTILLERY.

OF the many important matters affecting the Army, which now are attracting public attention through the press, many things of less moment, perhaps, but still important in themselves, are apt to be overlooked, and among these most surely may be classed Mountain Artillery. I may, therefore, be pardoned for referring to this subject and for calling attention to a most important branch of military art, that has heretofore been almost unknown, or unheard of among ourselves.

That the importance of this arm has always been well understood by military men, we have only to turn to the past to ascertain. Almost from the time of the first introduction of gunpowder, and the search that followed for proper weapons with which to develop this power, we find among the guns used various specimens of mountain artillery and a constant effort to perfect this particular arm is shown through all the centuries that have elapsed since its first inception.

We often hear the saying "there is nothing new under the sun," and this finds its application in the mountain, as well as field-artillery of the present, when compared with that of days gone by. In those early days, with the mountain and field artillery, as well as with the hand weapons in use, breech-loaders were among the first models to be introduced. We also find the "jointed" or "dismountable" gun, with the carriage capable of being taken apart to facilitate its transport on mule-back, and many other ideas which now are being revived and perfected. These first ideas were necessarily abandoned, not through any lack of proper principle, but for want of a proper powder, as well as because of the crude and imperfect workmanship of the day. To-day, with almost perfect mechanism and skilled labor, it would be strange if we could not take up and perfect those old ideas, and produce the modern mountain gun as well as others. But we should give credit to those old designers and

workmen who did the best they knew with their imperfect means, and who failed, when fail they did, for reasons beyond their control.

The very existence of these old guns, made with such care and labor, and the constant effort to perfect them, show, as I have said, that their importance was early recognized and no effort spared to provide mountain artillery. Guns must be had for all kinds of service, and when War calls upon men to fight they must be provided with the necessary arms for mountain use, as well as for the open country. Guns which are suited to the level plains may be wholly unsuited for the all but inaccessible fastnesses of a mountain country to which our enemy may retire, and as the service demands so must the arms be provided.

The past of our own country can afford us but little instruction in the use of mountain artillery. We could not expect it during the Revolution. Then the country was only a poor and struggling cluster of Colonies, but poorly provided with any of the munitions of War. Then *all* artillery was but hardly out of its infancy, and even the best was but poor as compared with that of to-day. During that struggle, no matter how guns may have been dragged hither and yon, no matter how difficult the task of crowning some height, the country was fortunate indeed to possess even what it had, and there was no time, no money, and no absolute necessity for the introduction of mountain artillery.

For years afterwards the artillery, as well as the army at large, had to struggle along in an almost chaotic state as the result of the poverty of the new government, and it does not appear that mountain artillery received any attention or use during the War of 1812.

The first attention that appears to have been given it in this country was shortly before the Mexican War. Probably the matter had received attention for years before in considering what the Army needed, and in following the experiments being made abroad. But, however this may be, the 12 pounder mountain howitzer, model 1841, appears to be the first officially recognized distinctive mountain gun. Others may have been occasionally used in mountain warfare, but with the introduction of this howitzer we had a distinctive weapon for this service, and doubtless it has made a good record in the many years since its adoption.

But with us, as with other countries, when first these guns were introduced, no effort appears to have been made to give to mountain artillery a distinctive and special organization, or to train men and animals for its proper and greatest use. With our small army, widely scattered over many miles of frontier, all busily engaged in the hard and thankless task of subduing hostile Indians, and opening up our great West, this was all but impossible. In fact, in the greater number of cases, artillery as an organization was entirely absent, and, when necessity demanded it, these mountain howitzers were packed and served by either cavalry or infantry, and the best use possible made of them under very adverse conditions. The records that have been made are, however, so inaccessible, so almost forgotten in their dusty pigeon holes, that, however successful, nothing is known from them beyond the fact that such mountain guns were made, issued and used.

Their record in the Mexican War is also unknown. Brilliant as were the engagements of that campaign, the armies engaged were small, and possibly but little use was made of mountain artillery, no matter how favorable an opportunity parts of the country may have afforded. Our enemies were then but poorly organized, and more poorly equipped. They were torn by internal dissensions that helped to make our victory easy, and perhaps the necessity for mountain artillery was never felt. So also in our Civil War, there were mountain batteries, but they were comparatively few in number, and their record does not show any startling or brilliant features, however hard or well done the work may have been.

The trouble is, and has been, that mountain artillery and mountain guns have never been recognized in our Service as anything but a temporary makeshift. Here and there they have been called into temporary use as occasion demanded, to be disbanded and the lessons learned forgotten as soon as the emergency passed. This does not detract from, but rather adds to the credit due those who have fought with them. Here and there, hard and thankless work has been done in packing and using these guns in our Indian conflicts. With no organization, no experience possibly, with but a poor outfit of animals gathered here, there, or anywhere, with but poor saddles and equipment, with no special training of men or animals, mountain artillery has gone forth, and worked, struggled and fought as best it could,

every one doing his best. They have learned much as the result of such experience; but the knowledge so gained has soon been lost for want of means to preserve it, and thus we have never long possessed a skilled or organized mountain artillery.

The greater credit is therefore due such work the less has been the possibility of preparation. It is one thing for a finely organized and equipped expedition to achieve success, and quite another and greater thing for a poorly organized and equipped command, through want of means, not *will*, to succeed also; meagre, therefore, as may be all our work with mountain guns it is entitled to great credit and consideration, and it is a pity that the lessons and experiences thus learned by many through many years cannot be preserved and made useful for the future.

Much has been done in a quiet way by many of our officers, and by the Ordnance Department, with a view to perfecting our Service in this regard. But a great part of this has been done more under the idea of a temporary makeshift, for any branch of the Service available, than as a permanent and special organization, fully equipped and ready at all times for mountain service.

With our Artillery School now organized at Fort Riley, has not the time come for regular organization of mountain batteries? This service calls for many special things, not learned in a day, that can best receive attention there. We have yet to learn what is the best method of packing; to devise and perfect all the apparatus necessary for prompt and efficient work in the roughest country; and at this school the time can be taken to conduct the experiments necessary to determine and perfect all the details of organization, equipment, armament, and all the methods of packing, transport, drill and manœuvres, and, besides this to keep the record of success or failure as a guide for future generations.

We doubtless can learn much from a study of foreign methods, equipment, armament, etc. But it is also doubtless true that methods of our own, better suited to our country and ideas would have to be devised. The conditions of a service, and the peculiarities of a people always finally determine the details of all such work, and experience and experiments are necessary to determine what is best suited to particular conditions.

Then again, more than all other services, does that of mountain artillery call for special men and a special organization.

Mountain service of any kind means hard work, and when such service is pack service it calls for special endurance as well

as skill to be able to handle and pack the loads, care for the animals, the rigging and apparatus, and at the same time be skilled in the handling and use of the guns and implements as weapons of war. "Handy" men are needed, men who have a fund of expedients with which to overcome difficulties, men who have a love for mountain life and who can stand its hardships, men who love as well as know the animals they have to use, and are not afraid to be around amongst their possibly lively heels and snapping teeth.

The armament and equipment must largely result from experience and experiment; but, broadly speaking, the gun, though light enough to be packed, must yet possess all the firing qualities possible. Pop-guns are not wanted; but guns as powerful as can be made, and yet packed, so as to have the range and power of fire so essential in modern warfare. Doubtless, much must be sacrificed to great mobility, and the power to climb and reach high positions in the roughest country, for, without this, mountain artillery would be but a name; but within these limits the greatest power possible should be given the guns, so that, if possible, they could play a fair part in open as well as in mountainous country.

We all know the confusion that has obtained in times past from the great variety of calibres that were given to field guns, and the consequent difficulty in the proper supply of ammunition. It would simplify matters greatly, therefore, if our mountain gun, though special in itself and in its uses, could have the same calibre and use the same projectiles as the field guns. Even though a lighter charge were used, as would be the case, there would then be but the one calibre of projectile for the two guns, the mountain gun could doubtless obtain all the range desired by the use of such a projectile and the maximum charge the gun could properly sustain. An element of uncertainty and confusion in the supply of ammunition would thus be eliminated, the supply of projectiles be always certain, so long as any projectiles of that calibre were at hand. The charge could be easily made up from any powder or cartridges obtainable.

In an article of this kind technicalities cannot well be entered into, so all data as to the best gun must be omitted. In broad terms, however, it may be said that successful results have been had in other countries with the "jointed" gun in actual service. These "jointed" or "dismountable" guns take apart, forming two

pieces for pack transportation, and by their use a more powerful gun and better results can be obtained. The transportation has of course to be increased to carry the gun in two parts rather than in one piece; the carriage, too, must be heavier, and possibly dismountable as well, increasing again the number of mules; but the greater results thus obtained seem to justify the extra cost of transportation, and these guns provide a battery that is at once powerful and capable of great service.

Those who are familiar with the pack train service of Arizona and our western frontier will join me in saying that, doubtless, the mule is the best animal for this service. Other countries may use horses, but the mule is by far the hardier, more surefooted, can carry more, is more easily kept in condition, and is in every way the better of the two. No animals but mules, even for riding purposes, should be permitted; then every animal, saddle as well as pack, would be available for pack service when needed, as all the saddle mules could and should be trained to the pack as well as the saddle. And if properly trained and handled they would all be tractable, easily managed and taught to stand fire fearlessly.

The mountain battery, of all others, should be for a maximum of work, and a minimum of show. Everything about the battery should be *for use*, and all as simple as possible and as easily adapted to its purpose as the nature of things will permit. Simplicity and plainness need not mean ugliness, however, and the battery might well be given a certain smart appearance at all times, so that the men might take a proper pride therein.

Even in the roughest of country, trails and roads are often available for long distances. To provide for this the guns and carriages should be, therefore, provided with proper means for draft.

Experience is necessary to say what this draft should be; but it seems to me that any limber is unnecessary and a pole or shaft attachment all that would be required. A limber would be a nuisance except for hauling, and has no other useful purpose. It would be heavy and bulky to pack, and the animals required for that could better be used to carry ammunition or other stores. This has been pretty well worked out abroad, and in no case of mountain artillery, pure and simple, is it used.

The draft animals are already present, for every pack or riding mule can carry a light breast harness and always be available

for draft. As many or as few as may be needed could be hooked on at any time, and the proper relief be given by changing about and not always be using the same mules for one purpose.

If, then, we admit, as I think we must, the necessity for mountain artillery, it would seem that the time has come for something to be done looking to its permanent adoption as a part of our field forces, to the necessary experiments and work to devise and perfect the details of its organization, armament and equipment, and to the necessary instruction of officers and men, so as to provide the proper force in case of need, and enable us to hold our own in mountain warfare.

A TRIP TO INDIA, CHINA AND JAPAN.*

BY CAPTAIN SAMUEL M. MILLS, U. S. A.

FIFTH ARTILLERY.

IT was my privilege, under the orders of the Government, to spend the winter and spring of 1885-86 in India, China and Japan, and as one of the two officers designated by the War Department, I witnessed the manœuvres of the British Army in India during that winter. I made full notes of what I saw during this trip, which I subsequently submitted to the War Department in the form of a report. There were many incidents and events noted which made an impression upon me, but which might not be altogether suitable to embody in an official report; some of these, it was thought, might be of interest to others, and at the request of the commanding officer, General Tidball, and others, I have put these notes in the form of several papers—the first two, simply a narrative of events and incidents, and the others a detailed description and discussion of the actual operations of the two army corps in the field.

This evening I will read one of the papers I have prepared under the first head, or narrative of the journey.

The facilities of travel which late years have developed, has made a trip to India, or around the world, not a difficult undertaking, but I wish to mention, that in the short time that was allowed me after receipt of orders to complete all arrangements and to reach Suez upon a given day, I could find nowhere any information of the shortest routes or lines of travel by which one could reach this point from this country in a given time, until it occurred to me to consult Cook's Tourists' Guide for Europe, etc., whose office is located in New York, where I had to go to get this information and make arrangements. It was through their office that I learned the hour of departure of the latest Indian mail train from London, which has the right of way through Eu-

*This is one of several papers read some time ago by Captain Mills before the officers of the Artillery School and Post of Fort Monroe, Va.

rope via Mt. Cenis, Bologna, etc., connecting at Brindisi with the Peninsular and Oriental steamers, and thence by rail to Suez, where direct connection was made with another Peninsular and Oriental steamer for India.

The officer, Colonel Lazelle, with whom I was associated during this trip, after receipt of his order, came from Vancouver Barracks, Washington Territory, and just had time to reach New York and catch the last steamer by which he could have reached Suez upon the day fixed by the British Government.

We reached Suez on the day appointed as the latest day for the meeting of the representatives of different nations that had been invited to witness the manœuvres of the British Army and to proceed to India.

The representatives were received on board the steamer *Assam* by Col. John Upperton, C. B., of the Bengal Staff Corps. This officer had recently been in command of the 6th Bengal Cavalry, and had received while in command of this native regiment in the Egyptian campaign of 1882 his C. B. He had been deputed by the Indian Government and sent from India to receive these representatives and provide for their comfort. From this date and until our final departure from India and return arrival at Suez, for those that returned that way, and an equivalent provision for those that did not, all expenses of whatever character in connection with our journey or stay in India, except such gratuitous money or presents, as we gave to servants, was defrayed entirely by the Indian Government, whose guests we were during this time.

The following is a list of the names of the representatives of the different governments deputed to witness the manœuvres in India, also the names of the officers of the British Army detailed to accompany them :

AUSTRIA.—Prince Louis Esterhazy, Lieutenant-Colonel 5th Hussar Regiment.

FRANCE.—Le Colonel Descharmes, Commandant le 19th Regiment de Dragons ; Commandant de Torcy, Major de la Division d' Alger.

GERMANY.—Major Von Hagenon ; Captain Baron Hoiningen Huene, General Staff of the German Army.

ITALY.—Colonello Brigadiere Seletta ; Captain di Valleris, Stato Maggiore.

RUSSIA.—Colonel N. Timler, General Staff Russian Army ;

Le Prince Odoïeosky Maslof, Colonel de la Garde á cheval, de S. M. l'Empereur de Russie.

UNITED STATES.—Lieutenant-Colonel H. M. Lazelle, 23d Infantry; Captain S. M. Mills, 5th Artillery.

ON SPECIAL DUTY WITH FOREIGN OFFICERS.

Colonel J. Upperton, C. B., Bengal Staff Corps. Major H. B. MacCall, Kings Royal Rifle Corps. Captain A. Montanaro, 16th, the Lucknow Regiment. Captain C. S. Wheeler, 6th Bengal Cavalry.

The Italian representatives had been serving in Massowah, which place we passed in the Red Sea, they had preceded us to Bombay some days by local steamers; the Austrian representative had also gone on to Bombay before. This prince has since this time visited this country.

General Saletta, the Italian, was the senior officer among the representatives, and very happily responded for us in French, the few occasions that this was necessary. He was a man about 40 years of age, and came from the engineer branch of the Service. The other representative from Italy was a young captain of engineers; neither of these officers spoke English. The two German officers were comparatively young men, the elder and senior in rank, Major Von Hagenon, had been for a short time with the English Army in Egypt in the last campaign, and had there met many English officers serving with the Indian contingent. This officer, when at his proper station, was in command of a battalion of cavalry. He had recently been serving in the Divisional Staff. Was in command of his troop and attached to a battalion that had taken Colonel Descharmes, the French representative, prisoner at the battle of Sedan. He was a man of considerable experience, and had been a representative of his country on other similar occasions; of very attractive manners and person, and spoke in addition to his own language, French, English and Italian. When in full uniform he was covered with medals, one of which was one of the degrees of the Iron Cross. The other German representative was the typical young German staff officer of to-day. A man about 36 years old, graduated and assigned to the Royal Engineers; served with the engineers as a lieutenant during the Franco-Prussian War; staff school three years, graduated and then performed the usual service with artillery, cavalry, infantry and marine artillery, and finally transferred

to the general staff. Was at this time an aide-de-camp to Prince Bismarck. Had been military attaché in London for a time, and had subsequently been sent there, when it was thought England and Russia would have difficulty, to observe military movements. He is apparently held in very high estimation by the German War Office. Is now and has been, since his return from India, German military attaché in Paris, and has recently been promoted to Major. Colonel Descharmes, of the French Dragoons, was probably the oldest officer among the representatives, a man about 52 years old; was wounded and taken prisoner as a captain at Sedan, and held as prisoner of war for a long time; came out of the war a captain, others in active service promoted over him, while he was held as a prisoner. Had served in London and in Japan as French military attaché. Commandant de Torcy,—commandant is not a grade in the French Army, but a title sometimes used which corresponds to *chef* or major. He had served a number of years on the staff, and was French military attaché at Constantinople in 1879, where I had previously met him. Had been a long time on duty in Algiers, from which place he had just returned, in the Divisional Staff. He had but recently been assigned to the command of an infantry battalion, due to the recent order abolishing or changing the permanent staff in the French Army. He spoke no language but his own, was a man about 40 years old, and was specially interested in the construction of barracks and hospitals for warm climates, with a view of adopting the ideas in Algiers.

The elder and senior of the two Russians, Colonel Timler, of the General Staff, was a man about 48 years old, had attained his present position by hard work and service in all parts of Russia. Being a Russian, and from the fact that the impression had preceded him that he was a prominent exponent of the Russian idea "On to India," made him a conspicuous representative and much sought after by the English officers in conversation, and natives curious to see a real Russian entertained and living as the guest of the Indian Government, which to them apparently was inconceivable. He was a very adroit diplomat, and I don't believe ever made a mistake or said the wrong word in replying to the many half serious innuendoes levelled at him in a good-natured vein as to what the Russians would do when they took India.

He was a very agreeable man, and a keen observer of military details. He spoke French and German and a very little

English. I had opportunities of performing trifling services for this officer on several occasions, for which he was much pleased. It was Sir Frederick Roberts', the general commanding in India, custom in the field at the close of the manœuvres each day to publicly comment upon the exercises of the day, in the presence of all the prominent officers, including the foreign representatives—the latter, I believe, are not always present on these occasions at the manœuvres in Europe. Sir Frederick, however, made it a special point that the representatives should have this privilege. It was difficult for a foreigner at all times to follow these remarks, and subsequently I would give these comments to this officer.

Prince Odoïeosky, the junior Russian colonel, was a man about 37 years old, of rather a delicate constitution, and easily knocked up by the rough jaunts we frequently had in the field. He wore most beautiful uniforms on occasions of ceremony, and when in uniform was decidedly the conspicuous member of the party.

At Suez were two steamers of the Peninsular and Oriental Steamship Company leaving the same night for the East, one of them going to Colombo via Aden, and thence to China, the other and the one we took went to Bombay via Aden, thence to Colombo, etc. Shortly after our arrival on board the steamer, and after mutual introductions, the steamer weighed anchor and stood down the Gulf of Suez for Aden, with the mountains of Sinai on one side and an Egyptian desert on the other. The Gulf of Suez is so narrow that you have a distinct view of both shores, alike hopelessly sterile, but enchanting in outline and color. The following morning we thought we would see the peak of Mount Sinai, but a mist of clouds prevented the view. We passed the place where it is supposed the Israelites crossed the Red Sea, but the exact location was left a little doubtful in my mind.

This sea is said to be the most oppressive stretch of water on the face of the globe, but on this occasion, the season of course was favorable, we experienced no discomfort, the thermometer ranging from 85° to 90°, but with a breeze. It is said, "In the summer time that the air is like that of a furnace, and the bare red mountains glow like heaps of live coal." We steamed monotonously for five days, the water as still and smooth as that of a lake, without seeing any wrecks, which until recently I believe was quite a common

sight. The navigation of this sea, on account of the numerous shoals and ragged coral patches along the shores, have been the cause of many disasters; the currents are very uncertain, and the coasts have until recently been poorly lighted. We passed Jeddah, the seaport of Mecca, and the imposing looking town of Mocha, from whence we are supposed to get our Mocha coffee, with its numerous mosques with lofty minarets showing out in relief against the purplish looking mountains behind, and finally reached the Straits of Babel Mandeb, the "Gates of Tears," and the Island of Perim, a bare rock of volcanic formation, garrisoned by a small English force, which island completely commands the entrance to the Red Sea and Suez Canal. The acquisition of the Island of Perim by the English was rather singular if true. It is said: "That a French naval commander was sent to seize this island in the name of his government, and being invited to dine on board a vessel in an English squadron, he indiscreetly revealed his mission, an officer at the table immediately after this recollected that he had forgotten something, excused himself, and while the Frenchman was regaled with wine dispatched a ship to capture the barren rock, the importance of which had not before occurred to them. When the Frenchman arrived he found the cross of St George floating over the coveted prize, and with it the command of the Red Sea."

After passing Perim the course is almost due east for about one hundred miles to Aden in the Arabian Sea. "Aden is a barren volcanic rock known as the 'rock of Aden.' The mainland of Arabia presents a level sandy coast with few indentations, and the Bay of Aden is formed by the narrow peninsulas which project from it at right angles, their extremities shooting up suddenly into clusters of black rugged volcanic cones about fifteen hundred feet high." No description can give an idea of the savage sterility of these mountains. "They are masses of cinders and scoria, glowing as if with still unextinguished fires, and the air around them seems to quiver with the heat radiated from their sides. Their forms exhibit all the violence of the convulsion which created them, heaps of burned fragments, cliffs divided by deep fissures, and sharp, inaccessible cones shooting upwards like congealed flames from the rubbish of extinct craters."

This description by an eminent author is not overdrawn. The town and fortress of Aden occupy the Eastern peninsula, and came into possession of the English in 1839. It is under the govern-

ment of India, being a part of the Bombay Presidency. It has been an important place from the earliest days, and in addition to marking one of the points of the "English highway from Europe to Asia," it is an important coaling station, and being a free port of entry, nearly all the products of the borders of the Red Sea are brought there for shipment, the principal of which are, coffee, gum, feathers, pearls and ivory.

As soon as our anchor was dropped in the harbor, we were surrounded by myriads of canoes of all sizes, from those only three feet long and a few inches wide, capable of holding a half grown person, to those holding two or three naked blacks from the opposite shores, who would dive from their boats and fish up silver coins thrown from the steamer, holding it between their white teeth as they came to the surface, and for a sixpence they would dive under the steamer and come up on the opposite side. This, with other natives in boats selling articles made of feathers, pearls and ivory, amused us, until the arrival of the Governor of the Island and Commandant, Brigadier-General Hogg; his actual rank is that of a lieutenant-colonel, there being no grade of brigadier-general in the English Service. He was the civil and military governor combined. He was accompanied by an aide-de-camp, and by Major Wickham, of the Royal Artillery. The aide was a lieutenant of the King's Royal Rifle Corps, the uniform, trimmings, etc., of which is very dark green, black almost, but permitted to wear white in warm climates. This officer was in white trowsers and jacket, with dark green or black helmet, belts, trimmings, etc. I was sure he was wearing regimental mourning, but learned differently before many hours. Major Wickham, the Royal Artillery officer, was completing his tour of duty in India, the last year of which is generally passed at Aden before returning to England. He had but a short time before relinquished command of an elephant battery, which curious organization I subsequently saw something of. He told me many curious things concerning the management of these batteries and how submissively and understandingly elephants would receive some continuous punishments for offenses, such as assisting another elephant to unfasten his chain and escape.

We were invited by the governor to visit the town, cantonments and "tanks," and other civilities were awaiting us, while the steamer was coaling. We went on shore in steam launches, where we found carriages waiting, us; our arrival of course was not

unexpected by this steamer, in fact, we found throughout India the governors of the presidencies and districts through which we would pass had been timely advised by the representatives of the Viceroy of India of our coming, and the entertainments, etc., which would follow. Near the landing were quite a few natives; they are a low variety of the Arab race, with dark brown skins, deep set eyes, long straight noses and handsome curling hair. The town, which is on the other side of the peninsula, contains perhaps 30,000 inhabitants; it is not seen from the landing. The road leading to it is alternately of sand and macadamized volcanic cinders, and follows the curve of the bay towards the northern end of the rock, where there is a strong gate guarded by a sentinel.

This affords the only land communication with the sandy Arabian plains beyond. After two or three miles the road turns inland, ascends the less abrupt slopes of the hills until it reaches an artificial pass about forty feet deep by twenty feet wide, cut through the comb of the central ridge. "This pass is closed by a ponderous double gateway, and the wall of circumvallation crossed by an arch."

An Indian Sepoy, the first we had seen, except one or two on duty with Colonel Upperton, stood guard at the gate, the guard-house was near by. The road was filled with Arabs from the interior, bringing camel loads of their produce to market, and with mongrel natives from the African coast. After passing through this cut, the town of Aden and the cantonments come in view. The town lies in a circular sandy basin almost inclosed by black mountains of volcanic cinder, the buildings are rather spacious huts of wood cane or mud, one story in height. The cantonments for the troops are the usual one-story mud or cane huts laid in lines with streets. The troops at this time consisted of one British regiment of infantry; two Native Indian regiments of infantry; two batteries garrison artillery; one English and one Native company of sappers and miners and one troop Aden horse (militia) for service on the island only. The British troops are changed usually every year, the Native troops every two years. The British troops, same as the officers before spoken of, having nearly finished their Indian service, usually complete their tour on the way home at Aden, before returning to England.

The "tanks," as they are called, are large circular basins of masonry, located at the foot of the gullies in the mountains for collecting water. These tanks were projected many hundred

years before, some of them were never completed, many others were allowed to fall into decay in subsequent periods, but all of them have now I believe been fully restored by the Indian Government. The dry bed of a torrent which divides the town, shows that it sometimes *does* rain even at Aden, though I believe ordinarily it only rains once or twice a year. I was told that it was a matter of record that at a distant period it rained but once in three years. Under these uncertain conditions it is necessary to save all the water and to use it sparingly.

Aden is known as the Gibraltar of the East, and like Gibraltar is now perhaps almost impregnable, but also like "Gib"—as it is called in the East—without being seconded by a fleet might be starved into capitulation. Immense sums of money have been expended on the fortifications and it is still being further defended. It resembles "Gib" in other respects, which I will not now stop to describe.

We returned from our drive and inspection late in the evening to "Government House" and dined with the Governor-General. As this was the first of the many formal dinners we had in the East, the surroundings left an impression on my mind. Government House is the residence of the person performing the functions of governor or senior representative of the British Government throughout all the Colonies. At Aden it is situated on high ground overlooking the sea, is a large single story "Bungalow," with heavy thatched roof, the eaves of which nearly reach the ground. The interior is divided by light partitions or screens of different colored hangings, into the various rooms for habitable purposes. The rooms were lighted by lamps of varied colored shades; the presence of ladies in light summer silks, the officers in white duck jackets and trowsers—we had left five inches of snow at Brindisi,—the Indian servants in white, with picturesque white turbans or "puggries," with bare feet moving noiselessly about on the matting covered cement floor, and the quiet swinging of the "punkha" suspended over the table to keep the air in motion, all gave an oriental or strange appearance to the scene which viewed for the first time left its impression. There were twenty-two that sat down to dinner, nine of our own party, and the remainder made up by the officers of the station, their wives and lady friends spending the winter there. Soon after dinner and our return on board we weighed anchor and had our last view of "Araby the blest," and for seven more monotonous

days we saw no signs of land, until we approached the Malabar Coast and entered the Bay of Bombay.

The approach to Bombay is very attractive. The following quotation gives an idea: "A considerable extent of the coast north and south is visible, the mountains picturesque and beautiful in their forms, and exhibiting in their drapery of forests a marked contrast to the desert hills of Arabia, which we had last seen. We were very soon near enough to distinguish the dwellings of the residents on 'Malabar Hill,' where the Europeans principally live, and the groves of cocoa-nut and date trees which cover the islands. The bay opens beautifully as we steam in. It lies between the islands of Bombay and Salsette and the mainland, and is perhaps twenty miles in length. Both shores are mountainous and thickly covered with the palmy growths of the tropics." Before reaching Bombay, while on board the steamer, we had received many insights into Indian life. The servants were all Indian Portuguese, and most of the passengers were officers of the Indian Army and civil-service men returning from leaves of absence, so that the novelty of first arrival in a strange land and in the midst of another race of people was somewhat lost, besides, as the guests of the nation, we were not permitted the experience that one gathers in visiting a new country for the first time, as everything was prepared by others and in advance for us. This, of course, was a great convenience and saving of much time and annoyance, but the ordinary traveller would encounter many experiences in making his way among the people that we did not have.

At Bombay we were met by another officer, Captain Montanaro, detailed to accompany us. He belonged to the Indian Army and spoke Italian. We spent several days in Bombay very pleasantly, the recipients of many attentions from Lord Reay, the Governor-General of the Bombay Presidency, the Provisional Commander-in-chief, Sir Robert Phayre, and other officials, and also from the different clubs, which are largely composed of officers and high civil-service men. General Phayre gave a large dinner party in our honor, and after dinner a "Shaminana," or open air concert or reception (December 30th) to which all the officers in Bombay and many prominent natives were invited. This was given at the "Cooperage," an historic spot, and under canvas, General Phayre and many of the officers living there in tents. Four bands were massed and under one

leader furnished the music. At Lord Reay's dinner party, the following evening, at Government House, on Malabar Hill, some seventy persons, mostly official, which included the consuls of different countries, sat down to dinner, but one lady was present—Lady Reay. Lord Reay, on this occasion, delivered an address of welcome in French, being an accomplished French scholar, to which General Saletta, of the foreign officers, replied. This was one of the few occasions upon which any formal speeches were made or expected. At all formal dinners, though, or when there was present with us any prominent English official, whether in camp, in the field, or cantonment, after the cloth had been removed, there would be placed on the table by the side of the presiding officer decanters of sherry, Burgundy, Madeira and claret, the person presiding, after helping himself from one of the four decanters, would pass them to the next person, who, after helping himself from one of the four, would pass them on, until all the guests had been helped, after which, upon intimation, all would rise, including ladies, if present, and drink to the toast "To the Queen, God bless her," at which the band would strike up the national anthem. All would remain standing during the playing of the first bar.

This custom prevails throughout the English Service; I have seen it at Woolwich and also at Hong-Kong. After this toast very little time is spent at table, and at no time is there excessive drinking there. Later though, and after adjourning to another part of the house, those that desired could find cigars and a "peg," or brandy and soda. "Pegs" are the usual drinks after dinner or at other times. A "peg" is Scotch whisky and soda or ærated water, which is now generally used throughout India, the latter being made in many places in India, and is much cheaper than soda water. The days of excessive drinking in India have passed so far as my observation extended. I saw none of it among army men or officials, nor evidences of it throughout my stay. I did hear though that certain missionaries had found a very large and more successful field of labor in the temperance cause among Europeans than in the conversion of the Hindoo.

Upon arrival at Bombay each officer of the party was provided with a Portuguese servant. These people are employed almost exclusively for this kind of service. They are indigenous to Bombay; all speak a little English, and are more or less

familiar with the various Indian dialects, which it is important to know in making a tour through India. I do not know what other languages these servants could speak, but the Russians, Germans, Italians, French and other representatives seemed to get on quite as well with them in their respective languages as we did. But fortunately it is only necessary to know a few words of the language of one in that capacity, the little intercourse outside of the usual routine, can generally be supplied by gestures, vigorous tone of voice, and exclamations. One thing, though, which saved us the necessity of supplying our servants with much information, was that we did everything as a party, were all invited on the same occasion, and after they were taught what would be the dress—for it must be remembered that we did not always adopt the same, for we represented many nationalities—Colonel Upperton would notify the head servant what we intended to do during the day, and this information would be communicated to them all, and this knowledge was often very useful in keeping us to the appointments.

The social obligations were many, but always pleasant and agreeable, and happy man was he that was blessed with a good digestion and a level head, for the hospitality was unbounded and continued for two months. If I am not taking up too much time on the subject of servants, let me say that this particular class of servants are not troubled with any particular caste prejudices as to the character of work they perform.

The Hindoo, for instance, we had many of them in the field with us, would not serve wine or meat, and only a very *low* caste Hindoo would perform the labor of "Bheesties," or water carriers, so that these Indian Portuguese are very useful as servants. Another feature of Indian social life may be a matter of surprise to you; an invitation to dinner at a private house or club includes your servant, as a servant, of course. I was surprised at our first dinner at the Bombay Yacht Club, to find my servant standing behind my chair, he waits only upon his "Sahib." At Government House private servants are not allowed, the domestics belonging to the establishment perform all the service.

While in Bombay we were located at one of the large hotels, at other places in India we had—while in the field and cantonment—our own camp, known as Foreign Officers' Camp, and when not in camp were generally put up at one of the large clubs of the place where for the time being we would stop. These clubs

form such a prominent feature of life in India, and in fact throughout the English Service, that I will refer to them further on.

While in Bombay we were afforded many facilities for sight-seeing, and one of the most interesting was a visit to the Caves of Elephanta, located on an island of that name some seven miles distant. Colonel Upperton and the officers associated with him made all arrangements for this and other excursions we frequently made during our stay in India.

A very convenient provision was made for us while in Bombay and at other places where we stopped for any time, and that was providing the representatives of each country with a carriage to themselves, and which at all hours was in readiness, standing before the hotel or club for our personal use. I have read that it is impossible to determine at what time the temples of Elephanta were excavated; there are no inscriptions, the Portuguese destroyed them, and no chronicler has written upon the altars B. C. so and so, as is found in Egypt, so we are entirely at liberty to retrace the ages even to the days of giants to ascertain their origin.

Some archæologists though, I believe, find a striking resemblance between these works and the vaults cut in the rocks of Nubia; in the shape of the columns, ornaments and idols. If these exist, and I believe there are other points of similarity, then it would seem their origin does not date further back than the ninth century of our era. Formerly there stood at the base of the mountain an immense stone elephant, which gave the name to the island and the caves; this, though, has entirely disappeared.

A long flight of stone steps leads from the landing to the entrance of the cave near the top of the mountain, and on the occasion of this visit was infested with beggar children. Near the entrance to the cave is a house in which lives an old pensioned sergeant of the former East India Service with his family, who has charge of the caves and charges a small sum of money for admission.

I will quote the following description of these caves and legends attached thereto, which presents it as it appeared to me:

“Massive columns which seem to be sustaining the mountain, form great square gateways to the entrance of the temple. Rows of columns, losing themselves in the darkness, support a huge

ceiling above which, and as it were crushing it, appears the enormous mass of the mountain.

“The plan of the excavation is that of a cross with arms of equal length. The greatest length of the hall is about 144 feet, and the ceiling is supported by forty-two columns, sixteen or eighteen feet in height, of which more than half have now disappeared. The capitals of these columns are cut in the form of round cushions, pressed down as by the enormous weight above into the shape of beams, which pass from column to column and appear to constitute a framework of timber. The order of these columns is considered one of the most beautiful that the Hindoos have ever imagined.

“The grand and imposing piece of sculpture that confronts you as you enter the temple represents, it is supposed, the three deities of the Hindoo faith, viz., Brahma the Creator, Vishnu the Preserver, and Siva the Destroyer. It is a triple bust twelve feet high. The central head is Brahma, on his right hand is Vishnu, and on his left is Siva.

“This idol has been for a long time the subject of much discussion among archæologists. Some recognize it as described above, others claiming to find in it all the attributes of the God Mahadeo or Siva, to whom the whole temple appears to have been consecrated. This opinion now, I believe, no longer admits of much doubt, for besides the fact that the Hindoos have scarcely a temple to Brahma, the statues which cover the walls all belong to the worship of Siva. The principal face of the idol is calm and benevolent, and, although mutilated, full of expression. The forehead is covered with a lofty diadem in the shape of a mitre, adorned with delicate carvings, in imitation of necklaces and trinkets.

“The figure on the right expresses rage, the mouth contorted with grimaces. The mitre is covered with serpents and skulls, the hand is held out from the altar grasping a cobra with its hood extended, an emblem of Siva in his manifestations as destroyer. The figure on the left is smiling and holds in his hands a flower.

“On the right of this triple bust and facing one of the lateral passages is the sanctuary, the most hallowed spot, in which is placed the *lingam* or emblem of Siva.” This symbol is met with so often in India, in by-ways and unexpected places, subterranean passages at Allahabad, and even at Penang, on the road-

side that leads to the Falls, in a little covered temple only two or three feet high, that a few words of description may be of interest. "Here is a small chamber, in the centre of which is found this adored emblem. It consists of a stone pillar or circular column about four feet high (the dimensions in other temples are much smaller) rounded at the top, and placed upon another stone (slab) of circular form, called Yoni, having a small trench round it to carry off the water with which the faithful be sprinkle it.

"The 'lingam' represents Siva in his mysterious emblem of generation, and the Yoni is that of reproduction.

"The Brahmins, rejecting every evil interpretation of these symbols, see only the principles of nature personified in their various attributes. To the eyes of the common people the 'lingam' represents Siva, and the Yoni his wife Parvati. This chapel is the true temple, where prayers are offered up and oblations made, while the immense chamber which surrounds it is merely a magnificent accessory.

"This immense temple has been entirely carved out of the mountain rock; chambers, ceilings, columns, statues all form part of the natural mass.

"The columns whose surfaces are most exposed have been gradually worn away by the water which infiltrates through the vaulted roof or accumulates in the hall during the rainy season."

There are many other passages, chapels and figures; those mentioned are the most important. Some parts of the ceiling and walls in the main hall show traces of color, which would indicate that all the interior might have been decorated with paintings. This temple has been abandoned for more than three centuries, and although they still hold a small annual fair, during which the great emblem is covered with flowers and adored, the Hindoos consider that it has lost all its sanctity. We spent the greater portion of the day wandering about and noting the beautiful views of the harbor and surrounding islands and returned to Bombay in the evening.

A drive through the Indian, or native town, called by Europeans "Black Town," is full of interest. On entering its huge bazaars for the first time you are almost deafened by the din that prevails, and half suffocated by the smells. A heavy perfume of "ghee," or grease, which is exhaled from numerous shops be-

longing to the poorer class of confectioners, almost turns the stomach. In spite of these you cannot help being interested in these famous bazaars.

“A world of peoples and races of perfectly distinct types and costumes are crowded together in the streets of this capital, which supplies the products of Europe to two-thirds of India.”

Bombay is the port of arrival for all who come from Persia, from Arabia, from Afghanistan, and the coast of Africa, and from here the pilgrims from Hindostan bound for Mecca, Karbala or Nujiff take their departure.

Besides the indigenous races which still present such varieties we see the Persian with his high cap of astrakan, the Tomali negro, the Chinese, the Burmese and Malay. This diversity gives to the crowd a peculiar stamp which no other town in the world can present. The Hindoo fakir, naked and hideously painted, elbows the Portuguese priest in his sable robe. The natives of Cabul and Scinde raise their voices in rivalry with the Hindoos, Mussulman and Parsees. The Tower of Babel could not have assembled a more complete collection of the human race.

Palanquins, native carriages surmounted by domes of red cloth, pass you in the street, drawn by beautiful oxen from Surat, covered with bells, as well as handsome open carriages from Paris and London.

The streets are bordered by small booths, the flooring of which, raised several feet above the roadway, serves for counter and stall.

The most diverse branches of industry are displayed side by side, but the most notable are the shops or manufactures in sandal-wood, ebony furniture, and works of art in copper.

In this part of the town is located the famous Arab stables, which we visited. These stables supply all the magnificent and costly horses used on the island and many for the English Service. Several officers are stationed here for the purpose of inspecting and purchasing. Here are found the finest horses of the East, most of them come from the provinces bordering on the Persian Gulf, Kittywar and that of Cabul, but the purest arabs, I believe, come from Dowfeb and Nedjed. Their value ranges for the purest or best from \$500 to \$1,000, and for the more inferior \$200 and less.

The horses for the British cavalry regiments are bred in Australia, and are called “Walers;” they resemble our Kentucky

horses. For the native cavalry regiments they use a cross between the native horse and Arab. They are small but very serviceable. The English officers use these horses for ordinary field service and for drilling, and reserve their "Walers" for occasions of ceremony, inspections, etc., when they are *required* to be thus mounted. The "Walers" cost from \$240 to \$300.

HEAVY ARTILLERY TARGET PRACTICE.

By LIEUT S. M. FOOTE, U. S. A.

FOURTH ARTILLERY.

SMALL-ARM target practice has reached such a state of perfection in the Army that we naturally turn to Blunt's Manual for assistance in determining regulations for a system of heavy artillery target practice. But the artillery student soon finds that the problem is too complicated for solution by such assimilation.

For small-arm practice the pieces are small and as nearly alike as it is possible for skilled workmen and machinery to make them. The ammunition is small and uniform. The ranges are small and the targets are such as to show the deviations of shots to fractions of an inch if desired. The ranges in yards are accurately marked upon the sights, which are so constructed as to compensate for drift. All necessary calculations can, therefore, be made beforehand, without fear that in another piece or in another issue of ammunition they will be found to be inaccurate. The ranges at different posts can all be the same. A great enough number of shots can be fired to thoroughly test each man's shooting capacity.

For heavy artillery, on the other hand, the pieces and projectiles are large and cannot, therefore, be made so uniform. The amount of powder is large and is never two days in the same condition. The ranges are great and cannot be made the same at all posts, nor the same at any one post, for two successive hours. The number of shots must be small, so that the most must be learned from each shot.

The rifleman has very little theory and a great deal of practice : the artillerist a great deal of theory and very little practice.

RANGE TABLES.

The range tables constructed for the various pieces, are in reality constructed for one piece, one projectile, one powder, one carriage, one condition of the air, etc., and are only approxi-

mately true for other pieces of the same calibre and under other conditions.

For accurate shooting, and as a matter of instruction, separate range tables should be constructed for each class of pieces at each post, each season, with corrections to be applied for changes in the barometer and thermometer.

I shall contrive to show the simplest possible construction of a range table, taking the equations from the "Hand-book" of Capt. Jas. M. Ingalls, 1st Artillery, Instructor of Ballistics at the Artillery School at Fort Monroe.

In all these equations the muzzle velocity enters, so that I shall begin with that. Very few posts have chronographs for determining this velocity directly. I shall, therefore, point out a method that can be employed at all posts.

Fire a series of four or five shots under as near as possible the same conditions as will apply during the practice season—same gun and carriage, same kind and weight of projectile, same density of loading, etc. Give, with the sight, exactly the same elevation each time, and be sure that the ranges are accurately plotted. Take the mean range as the correct one, and the elevation as that given. Compute the initial velocity by these equations:

$$A = \frac{\sin 2 \varphi}{C}$$

$$z = \frac{X}{C}$$

in which φ is the angle of elevation and X the range. $C = \frac{\delta^1}{\delta} \cdot \frac{\omega}{d^2}$, in which ω is the weight of the projectile in pounds, d its diameter in inches, and $\frac{\delta^1}{\delta}$ is a factor depending upon the density of the air, the value of which can be taken directly from Table IV., Ingalls' Hand-book, for any barometrical and thermometrical reading. A and z being thus obtained, V , the initial velocity, is taken directly from Table A. Ingalls' Hand-book.

The following equations give the other elements of the range table:

The remaining velocity is obtained by

$$S(v) = S(V) + \frac{X}{C}$$

in which small v is the remaining velocity and $S(v)$ and $S(V)$ are

values of functions of v and V , from which v and V can be found in Ingalls' Tables. The angle of fall is obtained from

$$\tan \omega = \frac{C}{2 \cos^2 \varphi} \left\{ I(v) - \frac{A(v) - A(V)}{S(v) - S(V)} \right\}$$

and the time of flight from

$$T = \frac{C}{\cos \varphi} \left\{ T(v) - T(V) \right\}$$

by the aid of Ingalls' Tables.

Obtaining or assuming any two of the unknown quantities in the above equations, the others may be obtained by a solution of the equations.

All the data with regard to the condition of the piece, charge, etc., should be carefully kept, to compare with that of other pieces or for future reference.

The values of small v obtained above may be made more accurate by multiplying by $\cos \varphi \sec \omega$.

$\frac{Wv^2}{2g}$ is the striking energy in foot pounds.

The drift is given nearly enough in the usual range tables, but can be computed if desired from formulas given in Ingalls' Handbook.

A range table determined for any piece should serve for all pieces of that class at the post for the season.

The ammunition for the shots to construct the range tables should be taken equitably from the allowance of all the batteries firing at the post, in case no extra allowance is made for that purpose.

CHART.

Every post has, or soon will have, an accurate chart of its surroundings. If this chart is drawn to the scale of 100 yards to the inch (as directed in Army orders) it may be found unwieldy. The 12-inch rifled mortar has a range of 10,000 yards. This would make the chart 200 inches, or over 16 feet square. 200 to 500 yards to the inch would seem to be large enough, and would make the map more convenient for use, especially at Division and Army headquarters.

The map of the fortifications, batteries, channels, harbors, islands, etc., should not be confused with the chart for use upon a plotting board. The former must be in a single piece, drawn

to a scale such as to give a comprehensive view of the entire situation. The latter may be changed so as to bring different parts of the map upon the board as may be desired, the scale being 100 yards to the inch. The former is for the commanding officer of the fort, the latter for commanding officers of batteries.

Again, it is directed that the map be divided into 100 yard squares by lines parallel to the edges of the map and numbered from the upper left hand corner down, and to the right. I suggest that the map be divided by east and west and north and south lines, and be numbered by figures in one direction and letters in the other. This method will prevent confusion, give a permanent designation to each square, enable one readily to orient himself on any chart, and permit the chart to be extended in any direction without changing the whole numbering.

BASE LINES.

There should be more than one base line at each post, for several reasons. In the first place some accident might happen to one station, and it should then be possible to substitute another without delay. If the target has such a position with reference to the base line as to make the triangle very irregular, results will be inaccurate. The nearer the observers are to the target the better. If only one can be near the target the other should be near the gun. The one near the target can be depended on for range and the one near the gun for deviation.

TARGET.

The method of constructing and anchoring sea-coast targets is given in Tidball's Manual, section 409.

OBSERVING INSTRUMENTS.

Azimuth instruments, reading to one minute, are used at the base ends. They must be provided with detachable telescopes, because the object sighted at to orient the instrument may be beyond the vision of the naked eye. In tracking vessels the telescope should be used so as not to sight at the wrong ship and so as to sight at a designated part of the ship. But for taking the splash of a shot the open alidade is better, as the field of view is wider and there is no danger of losing a shot. It is more accurate to catch the column of water in the air than to try to bisect the foam left on the surface.

PLOTTING BOARD.

For a plotting board that can be quickly obtained and shall be accurate, make a drawing-board as large as shall be necessary to contain, at a scale of 100 yards to the inch, the batteries to be fired from, the bases to be used, and the field of fire. Obtain section paper ruled into square inches and made in rolls 20 inches wide. (It costs about 30 cents per yard.) Cover the board with this, being careful to give the lines the proper direction to get the desired portion of the chart on the board. Number and letter the squares from the chart, and draw in the bases, batteries, ship channels, etc. For use at the base ends obtain two circular protractors of about five inches radius and reading by a vernier to minutes. (They cost \$20 each.) Have two holes drilled through the cross-piece and two through the rim of the protractor, and put wood-screws through them into the board, to hold the protractor firmly in place. Have the arm fitted with an extension arm three or four feet long. Set the protractors at the base ends with their zeros in the proper direction. A metallic arm about four feet long, graduated to fiftieths of an inch, and pivoted at the position of the gun will give the range to one yard. Use a scale about four inches long to obtain the deviations. The deviation should be measured at the position of the target. The observers at the base ends first send to the plotting board the angles of the target. It is plotted and the range given to the officer in charge of the firing. As a shot strikes, the angles of the splash are taken and sent to the plotting board, where the shot is plotted and the range and deviations—lateral and absolute—are measured and given to the recorder, who is provided with blank record sheets.

FIGURE OF MERIT.

In order to fix upon a figure of merit that shall be fair for all, the practice of different batteries must be as nearly as possible under the same circumstances. The same number of shots should be fired by each battery, at each range, with each piece.

The ranges should be 2,000 yards for the 10-inch smooth-bore, the 4.5-inch siege rifle, and the 10-inch sea-coast mortar; 3,000 yards for the 15-inch smooth-bore, 8-inch converted rifle, and 13-inch sea-coast mortar. These ranges are well within the power of the guns, and by assigning the guns to ranges according to their power it gives to all shots more nearly an equal value. But it will not be possible to anchor targets always at exactly 2,000 or 3,000

yards, so that we should have some method of reducing shots to a common range, for comparison. From the records of actual practice I find that both the lateral and longitudinal errors increase more rapidly than the range. I suggest the following method of reducing a shot from one range to another :

$$D = d \left(1 + \frac{\text{Difference in range}}{1,000} \right)$$

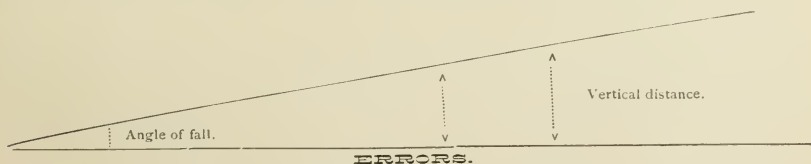
in which D is the longer and d is the shorter range. I have derived this rule from the records of both mortar and gun fire, and I believe it will be found approximately correct with all our present armament. Let all shots fired at targets near 2,000 yards in range be reduced to 2,000 yards in making up the figure of merit, and similarly for the 3,000 yard range. If loaded shell are fired with time fuses they should not be considered in making up the figure of merit, as the fuses can never be depended upon.

Let the area of the 25 per cent. rectangle, the target being assumed as the centre of the rectangle, determine the figure of merit.

To obtain this rectangle, find the numerical sum of all the lateral deviations, divide by the number of shots fired and multiply the quotient by 1.69, the result will be the width of the 25 per cent. rectangle. Similarly find its length. The product of the length and breadth gives the figure of merit of the battery.

PLOTTED RECORD.

Let the record be plotted on the scale of 10 yards to the inch. Take 1 yard of section paper, 20 inches wide, ruled into tenth inch squares. (This can be obtained for 30 cents per yard.) 15 inches from the bottom and 10 inches from the side, mark the position of the target and plot the shots reduced to 2,000 and 3,000 yard ranges, 10 inches from the side and 3 inches from the top, mark the vertical projection of the target and through it draw the ground line. Multiply each error in range by the tangent of the angle of fall at 2,000 or 3,000 yards. This gives the height or depth at which the shot would have struck the vertical plane through the target. Then plot the shots vertically. These vertical distances can readily be determined graphically :



Designate solid shots by a circle filled in —●—; shell by a circumference —○—; shots at 3,000 yards by red, those at 2,000 yards by black ink.

Designate shots from the rifles by one pair of radial marks —●—, —○—; those from mortars by two pairs. Mark the probable rectangle for 2,000 yards in black, for 3,000 yards in red, and the figure of merit rectangle in blue.

It would stimulate practice if badges were given to the battery making the best record at each instruction post, and a trophy to be held by the battery making the best record in the Army.

ESPRIT DE CORPS.

BY CAPTAIN CHARLES KING,

UNITED STATES ARMY.

WHAT a cry went up in the British Army when the fiat went forth a few years since, depriving those proud old regiments of the line of the designations they had borne for twice a century! With what sorrow were the old colors, with their blazoned numbers, sent back to "Horse Guards" and with what wild wonderment were the new received! How strange it seems to those who have read and revelled in the history and traditions of that most gallant, if often most misled of armies, to see no more in print of the doings of the 55th, the 88th—dashing old "Faugh a Ballaghs;" the 28th, they of the Square at Quatre Bras and Waterloo; the 1st, the 44th, the 9th, 21st and 47th, all old and war-tried foot regiments—and then the Highlanders—the 42d, the blessed old 93d—Colin Campbell's pets, he who never addressed them except by their numerical designation! Where are all the old numbers now? Gone to be replaced by such clumsy appellations as the South Staffordshire Light Infantry, the Northumberland Fusiliers, the West Middlesex Sharpshooters, and the "Horse Guards" only knows what all.

Of course, we know that many a "corps" that bore aloft its number on its colors, had none the less some pet name in which it took pride—notably the Highlanders—and by the same token were there not others like the 50th that struggled under *sobriquets* most undeserved? But the 88th were "The Connaught Rangers," the 25th "The Kings Own Borderers," the 42d, the famous "Black Watch;" and then we had the "Royal Scots," the "Cameron Highlanders," the "Sutherland Highlanders," the "Bufs," and so on *ad infinitum*, almost, but one *must* draw the line with the limits of the Army. How those fellows must have felt when their old names and numbers were stripped at the whim of a new War Ministry! Is there any one in our Service competent to say?

Of course, with their cavalry, it was different. To be sure,

some of the merry old Light Dragoon regiments of the Peninsula and Charley O'Malley days had been transmogrified into hussars, or lancers, but the change was not great. Think of the glorious trio that made up Ponsonby's Heavy Brigade at Waterloo and then, under gallant Scarlett, whipped ten times their weight at Balaklava—"The Union Brigade" where the rose, the shamrock and thistle charged side by side. The Royals of England, the Inniskillens of Ireland and the Scots' Greys whose "terrible grey horses" made Napoleon wince at Waterloo. What soldier would not glory in pointing to the number of his regiment of Heavies, and saying I am of the "K. D. G's."—or the Royals—or the Scots' Greys!

Then take the beautiful Light Brigade, they whom Lucan launched and Cardigan led to their fruitless sacrifice. The world never saw jauntier horsemen than those fellows of the 8th or 11th Hussars, or the 17th Lancers—the "Death or Glories" whose snow-white plastrons have gleamed all over the globe. They at any rate, preserve their numbers and the concomitant "honors." So, too, in the French—so, too, in the German Service.

"These legends and traditions" attached to regiments that have won a name are handed down from generation to generation, and every youngster joining has to study them up and pass his "quizzing" on any and all material points, or he is no true soldier. Is it not the custom in the Prussian Service for one regiment at least—the 1st Guard Fusiliers—to turn out on State occasions in the towering, stately, visorless, high pointed and ornate head-dress—resembling more the mitre of a bishop of the Greek Church than any martial top-piece—that was worn by this regiment in the days of Frederick the Great, and doubtless introduced among his impressed Potsdammers by his royal father? Do they not even now, when on review, march past with the utterly absurd goose-step required of them in 1750? "It keeps up the regimental tradition." That is all it is for, say they. But looking about us, it strikes the writer that it is a great deal—a very great deal.

What have we in the Service of the United States to foster *Esprit de Corps*?—to preserve regimental tradition?

No distinctive uniform, of course; no "from-time-immemorial-head-gear" like the Scots' Greys or the Coldstreams. No peculiar facings that tell the looker on "Ah! there goes the —th. They're the fellows that held the 'Molino,'" or "Look there!

That means he belongs to the Seventh. They lost half their number in one Indian fight years ago." We have few banners, colors or standards to speak of. Old England brings (she says "fetches") hers reverently home and places them with pomp and prayer and ceremony and presented arms and uncovered heads, high on the inner walls of her grand old churches. We, when ours become downright shabby, get a new set, after six months' correspondence and the Lord only knows how many endorsements; but what becomes of the old ones—who can say?

After all who seems to care much, anyhow? About the only time we ever saw them was when we went to call on Mrs. Colonel and noted them still eking out the feeble frontier ornamentation of the rather cheerless room. They looked a little more in need of dusting, perhaps, but did we ever see them brought forth under escort of "such a company" and received with wholesale honors? Did we really have a color-bearer selected, with his corporals, "from those most distinguished for bravery, and for precision under arms and in marching"?—And did they have any distinctive badge? Well—in a few regiments—with "live" colonels, yes; but in most cases, I fear me, no.

But we have some regiments, *Laus Deo!* in which tradition and legend and fellowship seem to go hand-in-hand. I love to get a letter from a Second Cavalryman and see its soldier crest and the motto "Toujours Prêt" on the envelope. It has its proud story written out in full, and Rodenbough and his comrades have told its glorious past. The divided days of the Seventh are gone forever, please God, and a splendid regiment, one in pride and purpose, has sprung from the thrilling episodes of its early history. Yet who is to gather and edit those scattered records of savage fight, cruel suffering and final triumph. Price, long before they laid him in his grave, put his shoulder to the wheel (and his hand in his pocket) and gave us a compilation of the regimental returns of the Fifth (Cavalry). Wilhelm has done the same for the gallant old Eighth Infantry. Powell told the story of his old love—the Fourth—before promotion took him from it; and even one of those "aggregations of batteries," the First Artillery, has found its Boswell in Major Haskin.

None the less, regimental histories are few and far between. Young officers entering the Service to-day, look in vain in the dusty shelves of the regimental library, for some book or pamphlet which will give them an inkling of the past service of the command

with which their lot is to be cast until they have doubled the years of the life now so full of enthusiasm. Finding nothing, they apply to some graybeard among the field officers or captains. "Tell me something of the service of the Steenth. Where was it during the War?" And in nine cases out of ten he will come away disappointed. "I don't know." "I wasn't with it during the War. The 'nth' was my regiment then." Or, "I was commanding a brigade of volunteers. I don't know who CAN tell you, unless you ask old Spigots, yonder. Seems to me he was Regimental Quartermaster in those days."

There is many a reason why our officers have not been to blame in this matter. The reorganization of '71 resulted in such a shaking up and reshaking that, as one gallant soldier of the "old Army" remarked in answer to a query: "What regiment do I belong to? Well, I have been borne on the rolls of four different ones in the last sixty days, and I'm d——d if I know which to report to."

The policy adopted by the Government in stationing its troops on the great frontier for years, after the Civil War, is another. Regiments were broken up and scattered broadcast over an entire department, merged with troops of other commands; placed under the orders of field officers of totally different organizations, and such a thing as *esprit de corps* knocked higher than any kite the famous Gilderoy ever dreamed of. In one four-company post has it not happened that no two of the companies (including cavalry troops) belonged to the same regiment? Other reasons—indifference due to long years of knock-about service on part of the seniors and sarcastic rebuffs at the expense of the juniors; the transfer on promotion of field officers to regiments, in which they found themselves as much at home as a cat in a strange garret; the absence of any distinctive regimental march to be played by the band when half a dozen companies got together on some surprising occasion. All these and others have tended to stifle the growth of the precious vine that thrives with such vigor in the heart of every English or German regiment and, twining its tendrils about every individual in the corps, holds them together in bonds indissoluble.

But, things are changing. With every day regiments are brought more and more into garrisons by themselves. Wondrous to tell there are posts where all the ten companies bear the same number over the crossed rifles on their forage caps and where the

colors are actually saluted. By regimental order the Third Infantry never marches in review except to the stirring "six-eight" swing of the "Rifle Regiment," composed and dedicated to them by Sousa. The Seventh Cavalry never parades without "Comanche" draped in mourning, and—*mirabile dictu*, the forage "expended" in feeding the gallant old steed, who has never done a stroke of work nor carried a rider since '76, has not been stopped against somebody by a government hitherto as unalterably opposed to sentiment as Gradgrind himself. It makes one think of Andrew Jackson's response to the would-be defamers of heroic old Captain C——. "Gets drunk every day of his life, does he? Well, so he shall, if it's any comfort to him and, by the Eternal, the United States shall pay for his whiskey."

The old Fifth—the banner infantry regiment in the days when Billy Chapman, "Beau" Neill and R. B. Marcy were among its model captains, and best known since as "Miles' Mounted Infantry" in the tough Indian campaigns of the seventies, has never lost the touch of the elbow that seemed so utterly lacking in the regiments raised in '61 and then split up like so much kindling wood in '66. So, too, "the Fourth that fought at Tippecanoe" and the old Sixth. Matters indeed have changed, for at last comes a formulated scheme to foster, promote and preserve the regimental feeling that for years at least was a minus quantity.

If ever a scheme was started by the Military Service Institution of the United States that should command the respect and co-operation of every officer who has a pride in his corps and regiment, it is that embodied in General Abbot's circular of Nov. 10th.* The idea of having printed in successive numbers of the JOURNAL, historical sketches of each regiment in the Service, and of the Staff corps that have been so essential to the Army in Peace or War, is simply an inspiration.

* See copy of Circular preceding *Frontispiece*.

Reprints and Translations.

PHYSICAL CONDITION OF HORSES FOR MILITARY PURPOSES.

BY GEORGE FLEMING, ESQ., C. B., LL. D., F. R. C. V. S.,

PRINCIPAL VETERINARY-SURGEON OF THE ARMY.

(Reprinted by permission of the Aldershot Military Society.)

THE subject which I have the privilege and the honor to introduce to your notice to-day, is one of much interest and importance to all who have to do with horses, whether in the Army or out of it; but more especially does it concern those who belong to the mounted portions of our forces; as upon their acquaintance with it, even to the smallest details, will, to a large degree, depend the efficiency and value of their different corps in Peace or in War. And nowhere, perhaps, could such a subject be more fittingly introduced and discussed than in this great centre of our military life, where theories can be tested and knowledge practically applied in all that pertains to the successful utilization of troops, whether mounted or dismounted. Here, at Aldershot, we have at all times, and in all seasons, a larger number of horsemen and horses than are located in any other part of the United Kingdom; and the training which they undergo, and the tests and fatigues to which they are exposed, brings them nearer to a realization of what actual warfare is, and what it demands from man and horse, than any other ordeal to which they could be subjected short of war itself.

The value of horses in land wars is so well recognized that it would be sheer waste of time to refer to it; but the value of studying their special aptitudes, their fitness for particular services, and how to obtain and maintain this fitness, is not always sufficiently considered; and when this is the case, there is danger that the advantages and benefits which should be derived from them will be only partially available or altogether lost. Whereas, with a good selection of horses for certain services, and judicious management of them, we may derive all that they can yield to man in the performance of the most onerous and severe tasks which may be imposed on them.

How horses can be best and most economically utilized in the Army, is a question which needs the most careful examination; not only because upon the results of it may depend the success of operations in the field, but also because of the increasing difficulty experienced in procuring, in a brief space, a sufficiency of horses to complete army corps, and replace the heavy

losses which are generally inevitable among them on active service. It is this question that I venture to bring before you now; and though I feel as if I owe an apology for my temerity in submitting to you views which can have nothing in the way of novelty in them, yet there may be points which will merit discussion, and differing opinions which it may prove beneficial to reconcile, so as to lead to amendment and improvement in horse management.

The physical fitness or condition of horses for military purposes depends upon several factors, the more important of which may be enumerated as:

1. Size and breed of horses for special services.
2. Food, with regard to quantity and quality.
3. Care and management.
4. Amount of work exacted.
5. Manner in which the work is exacted.

I. SIZE AND BREED OF HORSES FOR SPECIAL SERVICES.

There is not much need to insist upon the necessity for our horse supply being of the best possible quality, and well adapted in every way to the requirements of the different branches of our mounted corps. Our country is pre-eminent for its breeds of light and heavy horses, and we should, therefore, expect that our army horses would excel those of any other nation. I think it is questionable if our superiority in this respect is so marked as it ought to be, or if, with regard to at least one army, it exists at all. Perhaps our draught horses have improved somewhat, but we may entertain doubts whether the cavalry horses have gained much in size and quality during the last quarter of a century. Calling to mind the kind of horses upon which cavalry soldiers were mounted some thirty or forty years ago, one would feel inclined to express a doubt whether they are so good now as they were then. The opinion might be ventured that the modern system of racing has not proved beneficial to cavalry horses; and looking through the different regiments, and comparing the past with the present, we fancy we can see the effect of five-furlong races upon the troop horses of to-day.

Several things conspire to render these horses less suitable than in former times. Race horses were not bred for short races, but for trials of endurance as well as speed, and as it is to the race horse that we generally owe improvement or deterioration in our light horses, as he deteriorates in size and endurance, so will our cavalry remounts to a large extent. Again, before the advent of railways, in the days of stage and mail coaches, and when travellers and farmers thronged the roads on horseback, strong, good-paced animals, well adapted for cavalry, were common; now this stamp of steed is almost unknown. Therefore, it is more difficult to obtain horses physically fit for cavalry purposes now than formerly; and though, perhaps, they may show what is termed "Breeding," yet, considering what they have to do on active service, grave doubts may be entertained whether they have sufficient bulk and strength to sustain the trials which they would have to undergo.

It is possible that the steps now taken to improve the lighter breeds of

horses throughout the United Kingdom may, in the course of time, give us something like the old-fashioned cavalry horse, fit to sustain successive days of movement under a heavy load and on short rations.

If it be accepted as a fact that our cavalry remounts are, physically, not so good now as they were half, or even a quarter of a century ago, we certainly do not make amends for this by the way we treat them. Many are in the ranks doing hard work before they are five years old; and this is not conducive to their soundness or development. It would be in every way better for them if they were not compelled to undergo the fatigues of mature horses until they were five, or even six years of age, and perhaps it would be more profitable to the public. Almost every cavalry regiment has a number—some of them a large number—of horses too young for service, physically unfit, in fact; and if they were sent into the field they would probably succumb in a short time. Such regiments, though shown as up to their full establishment in horses on paper, are, therefore, not so; they are deficient in proportion to the number of young and old horses in the ranks. If it could be ordered that no horse should be considered physically fit until he had reached at least five years of age, then the casting period on account of age might be extended to eighteen years. Horses do not reach maturity—that is, the maximum of physical fitness—until they are seven or eight years old. When hard worked too soon, they are often worn out by that time; whereas, when allowed to attain their full growth and strength before they are severely tried, they might be able to perform good service up to even twenty years.

Of course, I am speaking of horses which are fairly well bred, of good conformation, in robust health, vigorous and active. It is all important that the Army should have such horses. Under-bred animals, whether for draught or saddle, though large enough, are soft in fibre and weak-hearted; they are unable to resist exposure and fatigue, and cannot be trusted on an emergency.

Associated intimately with physical fitness is "Pace." All military horses ought to be smart in movement, and of all the paces which should be found in perfection in them, walking is the one. Good walking, whether in carriage or saddle horses, should be considered as absolutely essential. Though cavalry horses should also trot and gallop well, yet quick walking is as great a desideratum in them. There is much more of this pace on service than of galloping, and it is perhaps the most trying; it is the pace which, according to an old cavalry general, "destroys more horses than do the enemy's bullets."

A horse, then, which may be considered physically fit, if of proper size and conformation for the service he is to perform, should be one which looks bright and lively, walks and trots sound and freely, has a shining coat, hard muscles, and eats, drinks and rests well.

This physical fitness we should find in greatest perfection in our fast moving horses—in cavalry and horse artillery; for it is upon them that the severest strain is imposed, as they have to move at all paces, and to cover more ground than the heavier horses, which generally move at a uniformly slow pace, and have their loads carried upon wheels. In modern warfare

the duties of cavalry will be heavier than in former days, and the brunt of the fatigue will fall upon the horses. Consequently, these horses cannot be too good. Nearly a century ago, a high authority on this branch of the Service, when insisting upon the necessity for cavalry arriving in a fit state on the field of battle, said: "A feeble, delicate horse, shaken by the constant weight it has to carry, and by bad and insufficient food, will be less certain to arrive than a powerful and robust one; or if it does reach the spot, it is exhausted at the very moment when it has need of all its strength. The rapidity of a regiment in the field depends upon the speed of its slowest horses; so that a horse should be able to go at an average gallop."

II. FOOD: QUANTITY AND QUALITY.

With regard to food in its relations to physical fitness, we all know that this should be sufficient in quantity, and good in quality; but a fact not often recognized, until too late, is that it should also be food to which horses are accustomed.

The quantity should, beyond a certain allowance, be in proportion to the amount of work performed, and perhaps also to the season. In our Army, there is a uniformity in this matter which reduces the question of feeding to the greatest simplicity, though it must be confessed that it is not in harmony with reason or experience. The forage ration is never varied all the year round, no matter how young or how old the animals are, how heavy or how light the work may be (with one or two exceptions to be presently mentioned); and large horses weighing 1,200 or 1,400 lbs. receive the same quantity as those weighing 800 lbs. This ration is, as you are aware:

If in quarters, oats 10 lbs., hay 12 lbs., straw 8 lbs.

If in encampments, oats 12 lbs., hay 12 lbs.

If employed on draught work, 2 lbs. oats extra.

The extra issue is allowed to horses of the Army Service Corps drawing wagons at a trot; and during the winter months only, for all other draught horses when employed on continuous draught work for a period of at least five hours a day.

An extra issue of 2 lbs. of oats, in addition to the ordinary ration in quarters or in encampments, is allowed to draught horses of the Army Service Corps when these are 16 hands high and upwards.

In Continental armies the allowance of forage is systematically adjusted to the size of all the horses and the nature of their work.

In the German Army, for instance, there are four scales of forage rations, the difference between them consisting chiefly in the amount of oats. There is, first, the heavy ration, which consists of 11 lbs. 7½ ozs.; second, the ration for light cavalry of the Guard, which is 10 lbs. 15 ozs.; third, the medium ration, which is 10 lbs. 11½ ozs.; and fourth, the light ration, which is only 9 lbs. 13½ ozs.

The allowance of hay is 5 lbs. 7½ ozs., and of straw, 7 lbs. 10½ ozs.

These rations are issued as follows:

The heavy ration is allowed to horses of general officers, the general staff, adjutants, officers of the War Ministry, cuirassier and guard lancer regiments, military riding school, guard horse artillery and field officers of guard field artillery, all artillery draught horses, those of the gendarmerie and intendance and transport draught

horses. Troop horses of the Gardes du Corps Regiment receive at all times 1 lb. $1\frac{1}{2}$ ozs. of oats, and 3 lbs. $4\frac{1}{2}$ ozs. of hay extra.

The second scale is given to the light cavalry of the Guard, guard dragoons and guard hussars.

The medium ration is for the lancer regiments of the line.

The light ration is for all other troops and the horses of officers not specified.

The above are termed the "garrison rations," and are only drawn for horses on the strength; the three or four extra horses in each squadron, battery and company of transport have to be fed on what can be saved from the forage of the others. It is not compulsory to give the horses their full rations daily, but a portion may be reserved for times when work is heavier than usual.

On the line of march the ration is increased as follows:

Heavy ration to 13 lbs. $3\frac{3}{8}$ ozs. oats.

Light Guard cavalry ration to 11 lbs. $7\frac{3}{4}$ ozs. oats.

Medium ration to 11 lbs. $4\frac{1}{4}$ ozs. oats.

Light ration to 10 lbs. $6\frac{1}{4}$ ozs. oats.

The heavy ration of oats is accompanied by 3 lbs. $4\frac{9}{10}$ ozs. each of hay and straw for feeding; the other rations having 3 lbs. 4 ozs. of hay, and 3 lbs. $13\frac{1}{4}$ ozs. of straw for the same purpose, as litter is provided in the billets.

In the field this ration is increased all round by $8\frac{3}{4}$ ozs. of oats, each horse then carrying what is called "the iron ration of oats"—nearly 14 lbs. the heavy ration, over 12 lbs. the second, 11 lbs. 13 ozs. the third, and 11 lbs. 1 oz. the light ration.

During railway transport each horse is allowed 3 lbs. $4\frac{1}{2}$ ozs. of hay and 2 lbs. 3 ozs. of straw to lay on the floor and ramp of the wagon. If the journey lasts longer than eight hours, 6 lbs. 9 ozs. of hay is allowed extra for every twenty-four hours.

During army corps manoeuvres and cavalry division exercises for a period of four weeks, the following rations are allowed:

For cuirassiers or horse artillery draught horses, 12 lbs. $14\frac{1}{2}$ ozs. oats.

For other line cavalry regiments and horse artillery riding horses, 11 lbs. $7\frac{3}{4}$ ozs. oats.

As on the march, 3 lbs 4 ozs. of hay and 3 lbs. $13\frac{1}{4}$ ozs. of straw are allowed.

Three-year old remounts at the remount depots receive:

Oats, 6 lbs. 9 ozs.

Hay, 10 lbs. 15 ozs.

Straw, 13 lbs. 2 ozs.

For three or four months of the year they are put on green food, but the transition to and from this is gradual.

In the French Army there is a similar gradation in the scale of forage ration, according to the arm of the Service and the kind of work performed. The light cavalry (infantry officers' horses are included in this category) allowance per horse per diem is: oats about $8\frac{3}{4}$ lbs., hay $8\frac{3}{4}$ lbs., straw $5\frac{3}{4}$ lbs. in garrison; on the march it is 10 lbs. oats, with the same quantity of hay and straw as in garrison; at manoeuvres, if the horses are in barracks they receive the same ration of oats as in garrison, with $6\frac{3}{4}$ lbs. hay and about 9 lbs. straw, but if in bivouac, then the ration is the same as for the march; while on a war footing it is 10 $\frac{3}{4}$ lbs. oats, $6\frac{3}{4}$ lbs. hay, and $4\frac{3}{4}$ lbs. straw. The line cavalry (the horses of engineer and infantry officers are on this scale) receive

in garrison 10 lbs. oats, $6\frac{3}{4}$ lbs. of hay, and 9 lbs. straw; on the march $11\frac{3}{4}$ lbs. oats and 11 lbs. hay and straw; at manœuvres, if in barracks the ration is the same as in garrison; if in bivouac it is as on the line of march; while on a war footing it is nearly 11 lbs. oats, 9 lbs. hay, and $4\frac{1}{2}$ lbs. straw. The reserve cavalry includes the horses of the staff, intendance, staff of artillery and of engineers, and auxiliary transport. The ration in garrison is: oats $11\frac{1}{4}$ lbs., hay 9 lbs., straw 9 lbs.; on the march it is, oats 12 lbs., hay and straw 11 lbs.; on manœuvres, if in barracks it is the same as in garrison, and if in bivouac the same as on the march; on a war footing the allowance of oats is 13 lbs., hay 9 lbs., straw $4\frac{1}{4}$ lbs. For artillery horses—draught and saddle—the garrison ration is $10\frac{3}{4}$ lbs. oats, hay 9 lbs., straw 9 lbs.; on the march it is 12 lbs. oats, 11 lbs. hay, and the same of straw; on manœuvres, if in barracks it is the same as in garrison, if in bivouac, the march allowance is given; the war ration is nearly 13 lbs. oats, 9 lbs. hay, $4\frac{1}{2}$ lbs. straw.

In the Russian Army the daily ration during Peace is as follows:

Guard cavalry and artillery, 12 lbs. $7\frac{3}{10}$ ozs. oats, 9 lbs. 1 oz. hay, 3 lbs. 10 ozs. straw.

Line cavalry, artillery and engineers, 9 lbs. $5\frac{1}{2}$ ozs. oats, and the same hay and straw as above.

Transport draught, 7 lbs. $12\frac{1}{10}$ ozs. oats, 18 lbs. 2 ozs. hay.

In the regiments and batteries of the guard, this allowance is given all the year round, but in other corps it is only issued for eleven months, the horses being turned out to grass, and only receive 13 lbs. $9\frac{1}{2}$ ozs. of hay for one month after the manœuvres.

If necessary, barley may be substituted for oats, weight for weight, and hay can replace oats in the proportion of 4 lbs. $8\frac{1}{2}$ ozs. of hay for 3 lbs. $1\frac{1}{3}$ ozs. oats. In War, the above rations are issued with the addition of 3 lbs. 10 ozs. of oats; and in lieu of straw 4 lbs. $8\frac{1}{2}$ ozs. of hay are issued. Thus, a forage ration of the line cavalry regiment during War is 12 lbs. $15\frac{1}{2}$ ozs. of oats, and 13 lbs. $9\frac{1}{2}$ ozs. of hay.

From this statement you will see that in the great armies of the Continent close attention has been paid to the quantity of forage required in each arm of the Service to insure physical fitness in Peace and in War; and you will also gather that in our Army this subject has evidently not received the notice it deserves. Our horses are either overfed while they are performing hard work, or they are overfed when this is light; and if the ration is sufficient for large horses, it must be more than sufficient for small ones. I am certainly of opinion that the whole subject of forage for our troop horses needs investigation; and in view of the fact that the allowance is not properly apportioned between light and heavy horses, or with reference to the work done, and that it is generally inferior to that of other European armies, especially that of Germany. I think the time has arrived when this inquiry should be made. In this inquiry the quality of the forage should not be overlooked; the present contract weight of oats is too low, and should be altered.

III. CARE AND MANAGEMENT.

With respect to care and management, I need not say much to you, except to state that in direct proportion as these are attended to, so will the physical fitness of horses be ensured. They comprehend so many details, that it is impossible to deal with them in a brief lecture. Grooming, feeding, shoeing, housing, equipping, working, and all the other points comprised

in these terms, are of great moment, and need constant attention in order to their being carried out to the advantage of the horses. Given good horses of the proper kind, and food sufficient in quantity and good in quality, their welfare then depends upon those who attend upon them. Only one thing I would like to refer to before leaving this section, and that is the necessity for inculcating kindness in all who have to do with horses. Physical fitness is closely related to mental fitness; for that horses have minds, affections, and memories, no one can deny, and all who have studied them will bear testimony to the effects of ill-treatment, and kindness upon them, not only in the performance of their work, but upon their durability. Horses kindly treated will do as much, if not more service in a given space of time, than those which are harshly used; while they will certainly last very much longer. With unfeeling treatment and bad management, horses can be worn out in a very short period; whereas, under the opposite conditions, their lives might be most usefully prolonged to more than twenty years.

Therefore it is that, in order to assist in ensuring the physical fitness of their troopers, soldiers should be continually reminded of the great importance of kindness to their animal friends and companions. Humanity to animals is a sacred duty imposed upon all of us; to the soldier it is this and something more, for his life may depend upon the reciprocal feeling of affection existing between himself and his steed. In the words of the old cavalry soldier already quoted, "The rider must live only for his horse, which is his legs, his safety, his honor, and his reward." Soldiers should never be deprived of their horses, if possible, if they have taken care of them; but they ought to be encouraged to form a friendship with them, or even to imagine a kind of proprietorship in them. Officers and men should learn as much as they can of the care and management needed to keep their horses in the best condition for work, and how to preserve them from injury.

IV. AMOUNT OF WORK EXACTED.

The amount of work which can be safely exacted from horses depends so much upon the points I have already specified, that nothing definite can be said with regard to it. Army horses are more exposed to extremes of toil than other horses, and during active operations hardship is usually added to fatigue—hunger and thirst, exposure to inclement weather, and often more or less serious injuries being superadded. It is under these conditions that the physical fitness of horses is most seriously put to the test; and well it is if this enables them to undergo them without breaking down, or becoming seriously impaired in efficiency at a perilous crisis. It only too often happens that there is no choice, during war operations, between moderate, heavy, and excessive work, and therefore, no rules can be laid down which might be made applicable. What is comparatively easy work for horses in good condition, during favorable weather, and in a country well adapted for movement, would be the opposite for weak horses in an inclement season, and in a heavy country.

V. THE MANNER IN WHICH THE WORK IS EXACTED.

Of course, everything should be done to guard against physical unfitness, no matter how severe the duty may be; and it is here that the skill and at-

tention of officers and men are perhaps rendered most conspicuous and beneficial. In performing exactly the same amount of work under the same conditions, one regiment or battery will have its horses in a good state during the whole time, while another will be nearly broken down. This will greatly, if not altogether depend upon the manner in which the work is exacted, and the amount of care taken of the horses. It is well known that there are horsemen who will get more work out of their horses, and at less expense to them, than others; and that a horse which, with judicious management, will perform a journey of many miles, can be exhausted in a few miles by unwisely urging him. It is not always the amount of work, but the manner in which it is performed, that does the damage.

Therefore it is that, in order to keep horses physically fit for their work, the utmost vigilance, knowledge, and forethought are imperatively necessary on the part of those who are responsible; and the task is not a light one in the field. At no time was it an easy one, and during active operations in the future it is to be apprehended that it will be more onerous than ever it was it will; certainly be no less exacting than it was during the Continental wars in the early part of this century, when a light cavalry general enumerated, among other requirements of a good cavalry officer, "readiness in judging of the state of health of men and horses; a knowledge of prompt remedies applicable in certain cases; a daily and careful inspection of the saddlery, and detection of the repairs required in it; provision of everything which may be useful to man and horse, without over-weighting the latter; inspection of the equipment and of the repairs required in it; intelligent packing of kit; regularity of pace on the march; good choice of ground for camping, and continuous supervision of everything which may affect the health of the horse there; the teaching of the means by which the services of a farrier may be dispensed with for the time being; * * * watchfulness to prevent useless expenditure of the strength of his horses; to give in all circumstances a personal example, and to give it all the more steadfastly as the situations are more trying and difficult."

For horses which have to move quickly over broken ground, and perhaps at the end of a long march, the greatest consideration is required to keep them ready for all emergencies; and it is to these horses that the foregoing remarks more especially apply. While the greatest attention is being paid to render the fire of artillery and infantry more rapid and deadly, and more extended, are we taking as much care to improve the mobility, the celerity of our cavalry in proportion, so as to place it on a more equal footing with these now formidable arms? I fear the answer must be in the negative; for while our horses have certainly not improved in quality, as cavalry horses, from what they were half a century ago, when fire-arms of precision were not known, the loads carried by these horses have not been much, if anything lessened. Not only have the arms of precision rendered it necessary that physical fitness in endurance and speed should be more than ever considered in our quick moving horses; but the electric telegraph, telephone, and visual signalling, have all concurred in demanding greater rapidity of movement from them, if cavalry is to be a potent factor in warfare. In connection with this point, the question of

the weight carried by cavalry horses is of the most vital importance. There can be no doubt whatever, that for the work which cavalry should do effectively in the field, the loads they carry are far too great. So far as I can learn, the estimated weight that a light cavalry horse should carry is more than 19 stone, showing the rider to weigh 10 stone; in heavy cavalry, the soldier weighing 12 stone, the horse carries more than 21 stone, and this without even a day's forage, which will add at least another stone; and if the weather be wet, saturation will impose yet another stone or two more. Celerity under such enormous loads is impossible; and when to these we have bad weather and scanty or bad forage, with long marches, it is evident that the destruction of the best horses is a matter of a few days; exhaustion must be rapid, and sore backs and crippled limbs inevitable.

There would appear to be a tendency to heap weight on horses' backs, even in mounted corps with carriages, as in the artillery and transport.

In the cavalry, the soldier carries on him 28 lbs. $3\frac{1}{4}$ ozs.; the horse equipment 74 lbs. $3\frac{1}{2}$ ozs.; in wallets 6 lbs. $14\frac{3}{4}$ ozs.; in front of saddle 8 lbs. $1\frac{3}{4}$ ozs.; behind saddle 12 lbs. $13\frac{1}{2}$ ozs.

In the Royal Horse Artillery, the soldier carries 28 lbs. $7\frac{1}{4}$ ozs.; the horse (including harness) 98 lbs. $14\frac{1}{2}$ ozs.; in wallets 8 lbs. $3\frac{3}{4}$ ozs.; in front of saddle 8 lbs. $1\frac{3}{4}$ ozs.

In Slow Draught Corps (Royal Artillery, Royal Engineers, and Army Service Corps), articles on driver weigh 18 lbs. 8 ozs.; harness complete 80 lbs. 8 ozs.; articles on saddle 26 lbs. 8 ozs.; articles in wallets 4 lbs. 8 ozs.

So that in the Royal Horse Artillery the near side horse carries 144 lbs., which, with the weight of the driver (12 stone) amounts to 22 stone, while in a field battery it is 21 stone; and these horses have to draw from 8 to 10 cwt. besides!

These terrible loads could surely be reduced, even if we must consider them as minimum—for it must be remembered there are many men in cavalry who weigh much more than 12 stone. I have seen men in light cavalry, who, in stable dress, weighed 16 and 17 stone. It does seem strange indeed, that in corps such as artillery and transport, the greater part of the killing load should not be transferred from the horses' backs to the wagons. An ounce on wheels is a pound on the saddle.

And surely the cavalry loads can be lightened considerably. Is it absolutely necessary that all the articles enumerated in the equipment list be carried on the saddle?

Wheel or pack saddle carriage should be employed to convey everything but what is vitally necessary for man and horse. It is astonishing how little is needed, if men are trained to require little. De Brack, who should have known what was necessary, says: "A valise for light cavalry which can hold more than a couple of shirts, a holdall, and under its flap a pair of boots, is not only useless, but really a danger. The fewer articles a soldier has, the greater care he takes of them, the cleaner he is, and the more ready, too. The chasseurs of the Imperial Guard went through the whole of the Russian campaign before my eyes, with a pelisse and a single pair of cloth Hungarian pantaloons." And he adds: "The art of carrying kit lies in three things—1st, to take only what is indispensable; 2d. to distribute the weight equally, fatiguing the horse as little as possible, and

not chafing him; 3d, to afford the rider the greatest possible facility in managing his horse, and to derive the greatest advantage from its powers. The art of packing is three-fourths of the duties of a cavalry soldier in the field."

The work of a cavalry horse is more like that of a hunter than any other description of horse; and we know what a hunter can do and how he must be treated in order to keep him physically fit. We also know something as to the price of a hunter able to carry 18 stone safely, and if he does two days' hunting in seven, it is usually considered enough; in the meantime, he receives such treatment in the way of housing, feeding, grooming, and other attentions, as the poor troop horse never knows at any time.

It is urgently required that the loads on army horses' backs be diminished to the very lowest possible weight. At no time should it exceed 18 stone, even with the best horses this country can produce; and that army which can muster a lightly equipped cavalry will certainly have a great advantage over one whose horses are heavier laden.

How reduction of weight is to be effected it is scarcely in my province to say, though I might urge that on the saddle and on the soldier little more should be carried than what is needed for actual conflict, and these articles should be of the very best. Everything else necessary should be carried on wheels or pack saddle.

It may be interesting to glance at the weights carried by cavalry horses in the armies of other countries, and compare them with those of our own.

FRANCE.

According to the Aide Mémoire of the Staff (edition 1888), the following are the average weights, including the weight of the rider:

Light cavalry.....	19 stone 1 lb.
Dragoons	20 " 2 "
Cuirassiers.....	23 " 10 "

It is added that these weights are increased by 1 stone 8 lbs. after exposure to rain.

A more recent article* in the *Revue de Cavalerie* (May 1881), gives the following as the result of official trials in several regiments:

Light cavalry.....	17 stone 11 lbs.
Dragoons.....	18 " 10 "
Cuirassiers.....	21 " 6 "

These weights were made up as follows:

	Average weight of man	Average weight of saddlery, etc.
Light cavalry.....	9 stone 6 lbs.	8 stone 5 lbs.
Dragoons.....	10 " 1 "	8 " 9 "
Cuirassiers	11 " 9 "	9 " 11 "

I may incidentally mention that the French light cavalry horses towards the earlier part of this century carried 112 to 115 kilograms, equal to 249 to 254 lbs., or 17 stone 11 lbs. to 18 stone 2 lbs.; being an average of 17 stone 12 lbs.

* Entitled "Trop Lourd."

ITALY.

Colonel Slade* gave the following as the weight of Italian cavalrymen with arms and accoutrements (forage not included):

Hussars.....	16 stone 8 lbs.
Lancers.....	17 " 4 "

This month he forwarded the following additional information:

LIGHT CAVALRY.

Average weight of man.....	10 stone 5½ lbs.
" " saddle complete.....	4 " 6½ "
" " carbine and sword.....	13 "
	<hr/>
	15 " 11 "

LANCERS.

Weight of man.....	11 stone 4½ lbs.
" saddle complete.....	4 " 6½ "
" sword, lance and carbine.....	1 " 3½ "
	<hr/>
	17 " 0½ "

In addition to the above the horse carries 12 lbs. of hay and 8 lbs. of corn.

Colonel Slade adds that the weights given in his report, No. 51, were taken from personal observations, as he had six men of each branch of the cavalry weighed, and struck an average. They differed a little from the above which he got from the War Office, and on one point in particular, he disagreed, viz., the difference between the individual weight of a light cavalryman and a lancer, as there is certainly not more than 7 lbs., whereas they show it to be 13 lbs.

BELGIUM.

Particulars of the new light saddle and equipment adopted for the Belgian cavalry will be found in War Office paper $\frac{0140}{306}$ with enclosures.

This saddle, designed by General Courtin, when fully equipped for the field weighs:

3 stone 1 lb.

The weight of corn for the horse and the rider's rations are included.

GERMANY.

Cuirassier's horse (marching order) carries.....	23 stone 0.388 lbs.
Man, average.....	13 " 5 "
Saddlery and kit.....	6 " 6.002 "
Clothing and arms.....	3 " 3.386 "
Hussar's horse (marching order) carries.....	18 " 5.554 "
Man.....	10 " 3 "
Saddlery and kit.....	6 " 7.630 "
Clothing and arms.....	1 " 1.8924 "

NETHERLANDS.

Cavalry horse (marching order) carries.....	17 stone 12.8 lbs.
Man.....	10 " 3 "
Saddlery and kit.....	5 " 4.8 "
Clothing and arms.....	2 " 5 "

* In despatch No. 51 of 1888.

SWITZERLAND.

Cavalry horse (marching order) carries.....	17 stone	5.66 lbs.
Man.....	10 "	3 "
Saddlery and kit.....	5 "	0.65 "
Clothing and arms	2 "	2.61 "

SWEDEN.

Cavalry horse (marching order) carries.....	19 stone	8.17 lbs.
Man (say).....	10 "	3 "
Saddlery and kit }	9 "	5.17 "
Clothing and arms }		

RUSSIA.

The average weight carried by the cavalry horse is 18 to 20 stone, as follows:

Saddlery complete with valise and great coat.....	83½ lbs.
Clothing and boots.....	8 "
Linen.....	1¾ "
Carbine, bayonet and cartridge pouch.....	11 "
40 rounds ammunition	3½ "
Weight of man	144½ to 180½ "

AUSTRIA.

SERVICE MARCHING ORDER.

Dragoons }	.....21 stone	3 lbs.
Uhlands }		
Hussars.	20 "	13 "

The weight of the rider is in each case taken at 11 stone.

I have now concluded my observations on the physical condition or fitness of army horses, but feel that I can have done the subject only scant justice. It is far too extensive for one lecture, but, nevertheless, I trust what I have ventured to bring before you relating to it may be amplified by the remarks of those of you who are in a better position to deal with it than I can pretend to do.

SUMMER TRAINING OF THE RUSSIAN INFANTRY.

(From the Russian.)

BY LIEUTENANT A. T. H. NEWNHAM,

TENTH BOMBAY LIGHT INFANTRY.

(Reprinted from the Journal of the United Service Institution of India.)

THE following is a summary of an article, which appeared in the pages of the *Voyenni Sbornik*, or Russian Military Magazine.

The author commences by recalling the fact that the parades and instruction of the Russian Army up to the period of the Turkish War were entirely of a showy character, but that the experiences gained in that war convinced the Russians that as troops exist for purposes of war, they should be trained entirely with that object in view. After the Turkish War the whole system of training in the Russian Army underwent a change, and the author proceeds to point out that although the general tendency of the new system is of a practical nature, there still remain certain points which, in his opinion, require altering. We will now quote his own words:

I will commence with musketry, as being the foundation stone of the Art of War.

This, as I remarked before, was always on a good footing, moreover, the regulations for it were well worked out, and frequently improved upon. The regulations to all intents and purposes are practical, but in my opinion the question of inspections is not as it should be.

Too great an importance is attached to these inspections, as is evident from the fact that the authorities have begun to publish in detail in general orders the results of musketry inspections and the defects that have been found by inspecting officers. The inspecting officers themselves have begun to judge of the efficiency of the whole by the satisfactory condition or otherwise of the part.

Musketry has aroused a sudden enthusiasm and has thus at one bound lost its significance as a means of preparation for war, and become merely a method for giving one regiment distinction over another, in other words, officers no longer exercise themselves about its benefit as a training for war, but about obtaining a high percentage of hits at the inspection. In actual warfare, troops manœuvre and fire simultaneously—in positions strange to them, at distances which have not been measured, in all sorts of weather, and at all times. Meanwhile all our military training consists of is to fire perpetually on the everlasting range, with the knowledge that the inspection will take place there, and that too under all favorable conditions (for the first period this is as it should be); moreover, the firing is carried out to the prejudice of other duties. Every one knows that the musketry course is made half as long again, by repeating portions of the practice, especially at 300 and 700 yards, although this is expressly prohibited in the Musketry Regulations. Where is the time for this obtained from? Of course, at

the expense of those very drills which are laid down in the syllabus. It sometimes happens even that the commanding officer permits no drills, except aiming, position and firing to be carried on before the inspection, and only upon the departure of the inspecting officer are the remaining drills commenced. They are then hurried through anyhow, while guard duties, pickets, and field exercises are omitted altogether: thus tactical instructions is by preference the very one to be curtailed.

A commanding officer has to have a great deal of character to prevent such a state of things. On all sides he is told that the musketry will be ruined, and this same falling off in the shooting is a serious matter and deeply wounds the vanity, not only of a commandant, but of the whole regiment. The latter feeling has its good side too, so that there is all the more reason to regret that the thing is carried out on wrong lines, while it would be so easy to put it on the right tack. I said before that it all depends on the inspections. I take it that all these irregularities would in a short time disappear if a different style of inspection were instituted, of which the following conditions should form the basis: 1. That the inspection should under no pretense whatever be carried out on the range. 2. That it should consist of two parts: *a*, individual firing as practised at present, but with half the number of rounds; *b*, tactical instruction with ball cartridge. 3. That the inspecting officer should inspect not only the firing, but the tactical evolutions and give them their due value.

For the first, the inspecting officer should carry out his inspection, not when the regiment is brought together for its annual course of summer drills, but when the division at camp of exercise takes place. In this way the locality would not be so well known to the troops, and the plan would also have the advantage of being more economical, since the number of places to be visited by the inspecting officer would be diminished almost by a third. Besides this the inspection itself not being carried out immediately upon the completion of the course would cease to be regarded in the light of a lesson, which had to be repeated and then put aside. Troops should always be able to fire well, and not only when the impressions left by a course just completed remain fresh. It goes without saying that under such conditions percentages should be entirely abolished as a means of judging merit.

As regards the second heading, the inspection of individual firing should be carried out as at present, omitting volley firing. For the individual firing sections might be called out instead of half companies, as being quite sufficient to give an idea of the efficiency which each company has attained in musketry training. In addition to this the composition of the section, if selected by the inspecting officer, will be of a more practical nature, as in every section there will be good shots and indifferent shots. Next, it will be necessary to form out of the regiment a battalion on a war footing, for which the inspecting officer himself will pick out the officers and men, but in no case should there be more than two company officers to each company, since in war there would never be more than this number.

The inspecting officer then gives out the general idea for the attack, and the targets being exposed accordingly, the practice begins, during the pro-

gress of which the inspecting officer or the commandant of the regiment* only interfere, when the officer commanding the troops or any part of the troops transgress their proper limits. Volley firing will be inspected during the movement, and not at the time of individual firing. The rounds for this will come out of the difference obtained by taking out sections instead of half companies during inspection of individual firing.

As regards the third, every inspecting officer without doubt is competent to judge of the tactical training, and to do this he should carefully note whether the movements are conducted in accordance with sound principles, whether the formations are regular and whether an ability to utilize the advantages of the ground is displayed, and in general so draw up his report on the tactical and musketry training of the regiment as to give no undue prominence to one over the other. In this way musketry will lose its one-sided character and go hand in hand with tactics, the general result being the much sought after preparation for actual warfare.

The consequence of all this on the musketry training will be to give it a more practical character. In my opinion it should be divided into two parts or periods.

The first of which in winter and spring will be strictly according to the letter of the regulations, all musketry of a show nature being omitted, to save time and avoid needless expenditure of ammunition. To effect this only one distance will be taken, from 400—600 yards inclusive, so that one regiment will fire at 400, another at 500, and so on, but so arranged that no regiment shall fire at the same distance two consecutive years. The volley firing should be removed into the second period.

In this latter period will be individual firing and afterwards field firing, which will be carried out by the two battalions in turn, every officer and man being present.

As regards the "Instructions for Field Firing in connection with Manœuvres, the three arms being employed," I see a great step forward in the right direction, and I would only observe that it would be desirable to give equal weight to the importance of the tactical and musketry elements, or even the supremacy of the former over the latter. Tactics decide the question of success in war, whilst musketry is only a means to that end.

I think, moreover, that the question of the duration of time, for which firing should be kept up on the targets, or dummies, should be left entirely in the hands of the officer commanding the movement, without hampering him with a strict adherence to the regulations, otherwise it may happen that one portion of the troops may have finished their rounds and remain inactive, whilst another is continuing to fire, which of course would never occur in actual warfare.

I will now pass on to the other points, also important, but comparatively less so, namely drill and tactical formations. As all know the former precedes the latter, and forms an indispensable stepping stone to it. In this department we have a whole library of books containing instructions and information of all kinds, but none the less it is impossible to pass it by

* A Russian regiment is composed of two battalions.

without mentioning the excessive length of words of command used in carrying out an attack, and pointing out the enormous gap between tactical formations and manœuvres between opposing forces. I will enter a little more into detail concerning this gap, since it deserves a fuller attention. To all appearances our present system of formation approaches that of Frederick, *i. e.*, line formation, with this difference that instead of a locked formation it is open; in spirit, however, we continue to uphold the perpendicular formation of Napoleon, as we preserve touch from front to rear.

The characteristics of modern warfare are the difficulty of directing large masses and the increased importance of the part played by junior officers. All this it is necessary to bear in mind in carrying out instructions in manœuvring.

Our soldiers are possessed of boundless courage, and our officers imbued with a lofty spirit of self-denial, in which respect they excel those of all other armies. It is this fact alone which has more than once extricated us from a position where any other nation would have come to grief. But this is not all that is wanted. The ability to make a rapid decision and one which meets the demands of the occasion, the gift of never under any circumstances getting into confusion, these are also invaluable qualities. How are they to be attained? In war men do what they know: they know what they have learned. Meanwhile our training is carried on in the most routine manner, although it must be confessed great progress has been made in this respect compared with what used to exist before the Turkish War.

In our attack drills everything is carried out according to a cut and dried plan, every company in correct order without any commingling of various detachments. This state of things would be very desirable in war, but unfortunately it often happens that something quite the reverse takes place, and troops accustomed to act only in conformity with a well-known plan unavoidably lose their heads as soon as they are confronted with disorder. It is only after some experience, and dearly bought experience, that they learn how to extricate themselves with credit. Let us look now how an attacking force advances into action. First it gets into fighting order from the line of march, outside the zone of fire; arriving within it, losses in the ranks immediately commence, at first slight, but increasing in proportion as the enemy are neared, and reaching their climax during the advance for the final attack. The reserves, which are behind, come up in succession, and get gradually absorbed into the fighting line, and unavoidably mixed up with it. The officers should quickly divide the commands among themselves, although very often under their command they may find not only different companies of their regiment, but parts of different regiments. The subordinate officers should be taught to quickly restore order, especially after the attack is finished, and to form up the men without delay under the command of the nearest officer, without rearranging them into their respective companies, and order them to take their commands from that officer.

Now how can all this be taught in peace time? Very simply. It is necessary only to practice losses on every attack parade, in proportion to

the strength of the position occupied by the enemy. This can be done by declaring certain men as out of action, at first in small numbers, afterwards in greater, in proportion as the distance from the enemy decreases, and most of all during the final attack, at the same time paying strict attention that the men rapidly close up. Under these circumstances reinforcements can be carried out without fear of creating a solid locked line, and also a certain amount of mixing up involuntarily takes place. With all this one must not forget that a detachment which has been told off to effect a certain object, must not be taken out of action until it shall have performed that object, and only in the event of utter exhaustion or the clear impossibility of effecting its end should it be transferred to the reserve.

The above mentioned practice of imaginary losses is useful for the following reasons: 1st. It accustoms the soldier to the idea that losses are inseparable from fighting, so that when he meets them in reality he will be less affected by them, although this feeling can never be entirely got over. Only those who have been in action know how the sight of the first killed and wounded acts on the nerves. 2d. It is good practice for the medical officers and hospital assistants.

These imaginary losses too must be carried out in the case of officers, with the exception of the officer commanding the detachment and the officer superintending the manœuvres. In this way junior officer will learn quickly to take the place of their seniors and fulfill their duties.

Regarding tactical instructions and manœuvres I would add that it is absolutely necessary to take care that the scouts conscientiously carry out their duties. In the majority of instances the work is performed quite mechanically. There would be no harm in the general officers deputing their staff officers to find out whether the scouts had a proper knowledge of their duties. Further, I would suggest, that in manœuvres carried out by small bodies of troops it would be a good thing to practice the attack and defense of certain features of ground, especially fortresses, according to the method laid down in Dragomireff's work.

Guard, and outpost practices are generally speaking established on a sound basis, but since no inspections take place in this most important branch of modern warfare, it stands a very good chance of being ruined, thanks to the innate carelessness of the Russian character. For this reason some sort of supervision is absolutely necessary, and this is easily insured. For instance, the general commanding a division might send his senior staff officer on the night appointed for picket duties to inspect the manner in which they are carried out, but he should in no case interfere. Every man employed on outpost duty should be able to give the desired information to all questions which are put to him by the staff officer, and the latter will then report all he has seen to the general commanding the division, and he, should circumstances require it, will demand personal explanations from the officer commanding the regiment. For regiments which are stationed where there is not a divisional staff, some such supervision is absolutely necessary.

In spite of the present fad for engineering, we have not yet reached the stage of being entirely carried away by it, and consequently the matter is

treated with common sense. The chief point is intrenching with the small spade, and especially under the enemy's fire. As far as I have observed this important matter is everywhere more or less well managed. The "Instructions" for it are excellently drawn up and the explanations clear and simple. The "Regulations for Instruction of Sapper Companies in the Infantry," are a little more intricate.

In my opinion the seconding of officers and subordinate ranks in sapper brigades is most useful, but the number of the latter should be reduced by half, so that fewer men should be taken away from their proper duties. The instruction of the subordinate ranks, however, in such an extensive programme as is laid down in the above mentioned regulations I cannot but think is both difficult and useless. Difficult, because the time allowed is not sufficient, and useless because the officers, even when they have gone through their course, can never replace engineer officers pure and simple, and secondly, because whenever any important fortifications or lines of communication have to be constructed an engineer officer with a company of sappers is always applied for. Besides which it is hard to ask an infantry soldier to carry out a purely engineering work. Moreover, during the course he forgets his own duties, and does not thoroughly acquire the new. For this reason I take it the "Regulations for Instruction of Sapper Companies in the Infantry" should be considerably simplified throughout all its parts, and more especially as regards fortifications and lines of communication.

It would be desirable to practice drill as often as possible with companies of war strength and also carry out manœuvres with opposing forces in the same way, although there is no provision for the latter in the syllabus of annual training. In this way the eye would get accustomed to judge distances accurately for taking up positions, etc., which with the present companies of half strength or even less cannot be practised.

Manœuvres on a large scale are carried out in a sensible manner; the commanders of opposing forces are granted full liberty of action, the troops are quartered for the night with a due regard to the progress of the manœuvres, and due attention has been paid to the working of the transport, our weak point. And yet much remains to be done as to preserving mutual relations between the various arms and the support which they should infallibly give each other.

These manœuvres, unfortunately, are very expensive and so cannot be carried out as often as one could wish. And yet it is a practice which is exceedingly useful for commanding officers and officers of the general staff, and also for developing enterprise amongst the cavalry, which thus has a wide field for operations thrown open to it.

During the last two or three years the authorities have begun to practice manœuvres in which fortresses play a part. The advantage of this is evident, but the plan is as yet new and not regularly established.

Would that it were so.

LETTERS ON ARTILLERY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by MAJOR W. L. HASKIN, U. S. A.

IX.

UPON THE METHOD OF RENEWING THE SUPPLY OF AMMUNITION IN THE FIELD.

I AM about to take up a subject which I fear will tire you beyond measure.

I propose to examine the reasons why our artillery suffered in 1866 for the want of ammunition, and the course which was followed in 1870 to cure this evil. I cannot avoid this tiresome subject.

It is certainly of the most supreme importance that the supply of ammunition should be renewed at the moment when it is needed, for what can an artillery line effect in an engagement if its ammunition is exhausted? One could hardly say as the brave Saxon general said to the battalion of *chasseurs à pied* which had exhausted its ammunition at Sedan: "Well, you still have cutlasses." He spoke thus, but he also remained near the battalion in the line most advanced, until a supply of ammunition was received.

This is why the artillery must devote as much zeal to the renewal of its ammunition as to making the proper use of that which it has. It is certainly the fact that many staff officers, after having elaborated the details of the operations against the enemy, feel a strong sense of impatience and *ennui* when it becomes necessary to dispose also of the tremendous columns of ammunition trains which hang like lead upon the heels of the army. From more than one of them will be heard the cry: "Ah! if you speak of the ammunition trains I shall be distracted." Nevertheless the trains must be provided for.

I agree that only to think of those immense columns of wagons which with incredible slowness dragged themselves behind the army and covered all the roads (in 1870 each army corps had nine columns of 27 wagons each, each wagon occupying a length of 20 paces); only to think of this, I say, totally annihilates the poetic—almost chivalric—idea that the young soldier, devoured with the desire to do gallant deeds, has of the pleasures of glorious war. I was not at all surprised that a young officer of reserve of the cavalry of the Guard, cadet of a noble family, who was attached to the artillery and who asked to be assigned to a horse battery, that this young man, I say, almost fainted with disgust when I had to tell him that he would be employed with the ammunition trains. But later he learned to look more favorably upon the duty which had fallen to his lot, for he found occasion to become engaged so far to the front that his horse was wounded in a fusillade—he found occasion to distinguish himself to such an extent in the first battle that his conduct brought him the iron cross.

The improvements in fire-arms have caused a considerable change in the manner of viewing the glory, honor, and chivalric conduct which in antiquity and in the Middle Ages alone made the law, and which were founded upon the skill with which one could fight with the sword, the axe, the lance and the mace. For in order to triumph over an Achilles before the walls of Troy, as over an Albert-Achilles of giant strength, there suffices now the same little projectile of nine millimetres calibre thrown by an arm of precision with which we lay low the weakest soldier.

Individual combat has a very small space in the action of the modern soldier. The infantryman is hidden in the rifle pit or behind a fence; he loads, aims and fires the piece which sends the projectile. The artillery fighting is even less personal. One man orders the details of the pointing and the kind of fire, another sponges, a third brings up the shell, a fourth places the fuze, a fifth sights, and the last pulls the lanyard; and nevertheless they are as truly fighting as was the cavalier who, sword in hand, went to the fight after the manner of the ancient knights. Now, honor and chivalric valor consist in fulfilling with precision, fidelity and calmness the duty which one is called upon to perform in defiance of the constant danger which surrounds one. This is why he who brings ammunition into the line of battle participates therein fully as much as he who expends the ammunition. What difference is there between the cannoneers who carry the shell from the caissons to the pieces and those who bring the caissons filled with cartridges up to the battery in action? You must agree that the work of replenishing the empty ammunition chests is certainly a very important part of the battle—of fully as much importance as the firing, the attack, or the taking of tactical positions in anticipation of the struggle, and hence you must force yourself to overcome the sentiment of *ennui* which involuntarily is felt when the subject is discussed, because of the number of very great difficulties which must be overcome.

I have no data concerning the special arrangements which were made in the wars at the beginning of this century to assure the regular renewal of the supply of ammunition by the armies then in the field. But it seems probable to me that the renewal was rarely necessary in the course of any single battle (with the exception, perhaps, of the battle of Dennewitz, during which Von Bulow sent to General Tauenzien an ammunition train), at least this necessity was not felt by the batteries which came upon the field of battle with a full supply. The regulations in this regard which have remained in force in our Army up to 1866 would seem to indicate this. But after the battle there was plenty of time and all the leisure needed to bring up a new supply, and the more so as the combats and battles did not succeed each other with such short intervals as in our last wars.

For even at the time when Napoleon I. conducted campaigns with the greatest energy, we do not find so rapid a succession of violent engagements as during the eight days campaign from the 26th of June to the 3d of July, 1866, in Bohemia; and the War of Liberation, which lasted three years, did not count as many as the War of 1870-71, which lasted six months. Add that with the breech-loading pieces, it will certainly occur that in critical moments a much greater expenditure of ammunition will be made than

with muzzle-loaders, which take so much more time to load ; and also that, the battle once decided upon, masses of artillery are now required to open the action much earlier, and are no longer held inactive in reserve. Armies are now larger, and on that account also the expenditure of ammunition is greater, and it is necessary to renew the supply more frequently. For the same reason the roads, more than in the past, are covered with great masses of troops and the ammunition trains which follow them have to struggle with a greater number of difficulties and obstacles.

At the beginning of the century it seemed to satisfy all the requirements to cause a certain number of ammunition trains to follow, and to add caissons to the batteries. It does not appear that a special service, marching with the precision of mechanism, was organized.

At least when, in 1866, the Inspector-General of Artillery asked the advice of two veterans of the War of 1813 who were no longer on the active list, in regard to whom he should put in charge of the duty of bringing up the caissons, one of them replied that he would not assign the duty to the staff-sergeant for his, in 1813, was such a coward that in every engagement he saw a battle lost and ran away with all his wagons. The other replied, also, that he would not place that duty upon the staff-sergeant for his "was so brave a man that he could not do without him in the battery when it had opened fire."

If the regulations concerning the renewal of the supply of ammunition which were in force with us up to 1866 were based upon the experience acquired in the wars of 1813-15, one would be tempted to believe that no battery in those times ever exhausted in one day all the ammunition which it had in its caissons and limber chests, for these regulations went no further than the replenishment of the limber chests of the pieces from the caissons. As to refilling these last, the regulations contained but the single rule: In his report of the battle the captain commanding the battery shall furnish a list of ammunition expended, and will make requisition for a new supply. He will then receive an order indicating where the requisition will be filled. This requisition was forwarded through the regular channels to the general or other superior officer who commanded both the battery and the train.

It is perhaps the minute control that was practised in all the branches of our military and civil service, and which, without doubt, from a general point of view, has been the principal cause of our having such perfect public servants ; it is perhaps this control, I say, which with time has contributed to create in the branch of the service of which we are speaking, this over-scrupulous and red-tape spirit which, when the service was for the first time called into action in the field in 1866, necessarily produced considerable and even irreparable delays.

It was required in this campaign that the batteries and ammunition trains should furnish at regular intervals reports, made out upon an imposing model, of the amount of ammunition on hand. These reports were verified by the corps chief of artillery, and the issues and receipts should balance. According to the supply on hand, as shown by these reports, the corps chief of artillery made requisition on the Chief of Artillery of the

Army for any deficiency, and he gave an order upon the depot of field ammunition from which the trains were to obtain the amount required.

Besides this, after each engagement every battery commander was required to furnish, with his report upon the battle, an extra statement showing the ammunition on hand, and in accordance with this report received an order upon the ammunition train for the renewal of the amount expended.

Although the amount of clerical work thus made necessary was much reduced by the printed forms furnished the troops before their departure from garrison, you will nevertheless agree that, reduced as they were, they not only inconvenienced the battery considerably after an engagement, but that it was impossible to finish them at a time when the battle had lasted till nightfall, and the battery had to pass the night in bivouac wherever it happened to be, in the rain and mud, so as to be able to continue the march at daybreak. For this report upon the battle should be accompanied by a sketch, with a list of losses, and a list of the names of those recommended for decorations. It happened sometimes that several days elapsed before the general commanding the corps artillery was able, by the receipt of these reports, to make requisition for the needed ammunition, and during all this time the batteries were waiting for it.

This matter took even more time with the chief of the reserve artillery of the First Army in 1866, for it was necessary that the requisition should reach the general commanding the artillery of the whole army, because there was no special commander for the III. and IV. Corps, and it is there that the order was issued upon the general commanding the reserve artillery of the First Army under whose orders were placed the two battalions of the ammunition train.

The number of caissons and wagons of this great artillery reserve marching behind the army was enormous, and in consequence, the distances that it was necessary to traverse to reach them were so considerable that the orders for the replacement were executed very slowly. Consider that this artillery reserve with its fifteen batteries and two battalions of ammunition trains covered, when in march, a length of 27 miles. This length of column also rendered the transmission, at the proper time, of the orders governing its march a matter of great difficulty.

It could easily happen that a battery had not been able to renew its ammunition four days after an engagement, because the ammunition train had not received the order necessary for its issue. Hence, when the battery entered a new engagement with perhaps four empty caissons it very soon exhausted the remainder, and nevertheless no one could be blamed. The very impractical character of the regulations, concerning the manner in which the battery caissons should be disposed of, made equally doubtful the renewal at the opportune moment of the ammunition in the limber-chests of the pieces. These rules required that the caissons of a battery should be divided into two groups, of which the first, consisting of two or three caissons and a repair wagon, should follow the battery at a distance of 300 or 400 paces; while the second, including the rest of the caissons, should remain out of range of the enemy—that is, at least 1,000 paces in rear. It

was very difficult to conform to this regulation when a battery acted alone for the chiefs of the groups—who were non-commissioned officers, or even private soldiers—could not, when a sudden change of position was made, receive the necessary orders in time. Besides that it was not always possible to find in the ranks men with the necessary address and intelligence. Therefore when the battery retreated it could be seen often that the groups of caissons barred the road, or closed the defile, or, finally, found themselves nearer the enemy than the batteries themselves.

You can easily see how these difficulties would increase, how they might even constitute obstacles which it would be impossible to overcome. as for instance, when many batteries advanced upon a single road to occupy a new position, or when still other troops came up on the same road to enter the struggle. The unhappy private soldier who commanded one of these groups would find himself with his three or four vehicles considered by the regiment of infantry or cavalry to which he barred the way as a fraction of a train which was out of place, that is, he would be thrown into the ditch.

Figure to yourself an army corps whose batteries are all in action. Behind them, at a distance of 300 or 400 paces, are posted as many little groups of three or four wagons each as there are batteries; conformably to the regulations they seek sorrowfully and vainly "to shelter themselves behind whatever cover the ground affords." At a thousand paces at least behind them are posted other groups of equal number, each containing seven or eight carriages, who have instructions to avoid entering the zone covered by the enemy's fire. Suppose the least crisis in the battle and necessarily the most horrible disorder will ensue. I do not know if the thing really happened, but if the regulations then in force were observed and the second groups of caissons belonging to those of the batteries, which in the combat of Nachod, made with the whole of the advanced guard a retrograde movement, had been obliged to hasten out of the zone of fire in retreating and to precipitate themselves head-first into the defile of Nachod they would have met there the bulk of the army corps and might have checked its advance. If this did not happen it was because the chiefs of those groups disobeyed the regulations.

I have my reasons for believing that these regulations, so unnatural, concerning the manner of conducting the caissons, rules which were yet in force in 1866, were not formulated during the War of 1813, but that they were formulated long after that time, with the best intentions in the world, by aides-de-camp who never saw active service. The general who approved them doubtless attached very little importance to them, because in the War of 1813-15 there was probably no failure of ammunition in the battles, and after the battles there was always plenty of time to refill. A few words spoken, when I passed my examination for the grade of captain, by the chief of the regiment to which I belonged, Colonel Von Rohl, makes me believe this. He was one of the veterans of the War of Liberation and was decorated with the iron cross. When he was in very good humor and among friends he spoke the purest *Berlinois*. I had told him during my examination what the regulations were with regard to renewing the supply of am-

munition. He said that my replies were perfectly satisfactory and in agreement with the regulations. "But," he added, "don't you know that that is all nonsense? In the field no one pays any attention to the regulations. Two *échelons*! Nonsense! In the field we march with all our carriages, and when the enemy begins to fire we say 'Caissons to the right; there in that field,' then we go to the front and fire. Then we send some one after them when we want them." I expressed my regret to the colonel that I had been obliged to learn what might be termed "nonsense," and asked him how I could find out what was worth learning. "My dear boys," he said, "Do not study so much. It only makes you stupid." You see he could not be classed among the "scientific" artillerists.

The ancient regulations which we are discussing also stated that it was necessary to proceed to the replacement of exhausted ammunition (with the exception of canister, which should be replaced immediately) as soon as there was a cessation in the firing or in the general battle. "You will proceed, at the latest," continues the regulations, "to the renewal of ammunition when you have expended half of the ammunition contained in the limber-chests of the piece,"—that is, it was not required to renew the supply during an engagement except in this case. But with rifled pieces it was found that at that moment it was already too late. These pieces could be loaded much more quickly than the smooth-bores, and could in a very short time, if rapid fire were ordered, expend this second half before the order for the renewal could have been executed.

As to what a battalion commander should do with his caissons, when he was required to bring into action under his own command all four of his batteries, the regulations were absolutely silent, and nevertheless we saw during the period of battalion manœuvres, almost every day, entire battalions making evolutions together, which evolutions would not be possible if, at 400 paces behind each battery, three or four caissons marched. What, for example, would become of these groups of carriages if the commands were given: "Platoons. Right wheel. March—Column left. March"?

When we heard the alarm in the bivouac of Rettendorf very early in the morning of the 3d of July, 1866, I was sent to Königinhof to the railroad depot to receive orders, and immediately went there. At the moment of starting the chief of the second battalion, Major Von Miesitschek, asked me to authorize him to take in his battalion with all the pieces in the lead and the caissons following. "Unless I can do this," he said, "I cannot command the battalion as a whole and lead it against the enemy." I was in a hurry, and in leaving him, said: "All right. Do as you please." I had occasion to regret this extremely, for what happened? The order given at Königinhof by the general commanding the Guard Corps was to the effect that the reserve artillery marching behind the first division of infantry of the Guard should cross the Elbe at Königinhof, and that the second infantry division should follow it. After having conducted the head of the reserve artillery into Königinhof,—after having begged the general commanding the second division of the Guard to give it the road,—I had gone to the front by way of Chotieborek to view the situation. The second division of the Guard allowed the batteries to pass and enter the defile, but when it saw behind the bat-

teries a column of caissons that they took (there were forty of them) for the ammunition train, anxious to be taking part in the action and in no way desirous of coming upon the enemy after the "train," the division began its march and directed the caissons to give way, since there was a general order to the effect that until further instructions the ammunition trains should not cross the Elbe. This is why it came to pass that during all that battle the caissons of the batteries of the reserve, having crossed the Elbe after the last man of the corps, ran from right to left seeking over the whole field of battle their batteries, which they found only after the battle was wholly over.

If I had had them at my disposition sooner—if Von Miesitschek had obeyed the regulation which prescribes that for forced marches a caisson should follow each piece—I would have had at Chlum at half-past four o'clock my full supply of ammunition, and would have been prepared to stop the enemy's forward movement without needing assistance, for General Von Dresky is right when he says: "Attacked in front an artillery line cannot be broken," that is, if it has ammunition. But we were without it, and were not then in a state to hold our position. Many of the batteries had only a few cartridges. I therefore followed our infantry, which was pressed very closely by the enemy in superior numbers, and which retreated to the height upon which the northern extremity of Chlum is situated, after which the Prussian I. and VI. Corps came to the front and checked the enemy's advance.

One thing was by this firmly impressed upon my mind: "Never permit all the caissons to be separated from their batteries."

If, further, you consider the fact that the regulations, in regard to the mode of renewing ammunition, are insufficient in that there is no article therein formally prescribing that a battery having no more ammunition is not the less obliged to retain its position in the line; you will find it very natural that the batteries which had exhausted their ammunition and were without defense should prefer to retire to the rear rather than to see their pieces fall into the hands of the enemy.

You desire to know upon what principles, as opposed to those in force in 1866, we proceeded in the War of 1870-71, in the renewal of exhausted ammunition.

I will describe to you the mode observed in the Guard Corps, but I do not know whether the same routine was followed in all the other corps. The inspector general of artillery had amended the rules which had been recognized as insufficient in 1866, and the new directions gave the greatest liberty of action in all the details of the service. I do not recall exactly which were the formally prescribed measures, and which were those which originated in the liberty left to the troops.

I will begin with the manner in which the batteries received their ammunition during an engagement.

During the march the batteries never took any other formation than that prescribed for forced marches. Behind each piece came a caisson, which was under the control of the chief of piece. Behind the battery came the repair wagons, field forge, and baggage wagons (all the wagons of

the administration service), under the quartermaster or sergeant of equipment. No other formation was ever made use of than column of section, or the battery in line. Even in this last formation the caissons followed the pieces, and in a third line came the four carriages of the administration service. When the battery was to go into action the order was given: "Form Echelons." At the moment when the battery came within range of the enemy's projectiles the pieces went forward. They were followed immediately by the first echelon of carriages (three carriages and a repair wagon). The second echelons of the batteries (there were still six carriages per battery), of the whole battalion united, under the command of an officer, were posted upon a point which the battalion commander was required to designate. When the battery came into action the carriages of the first echelon posted themselves on the left of the pieces upon the same front and with the same intervals. The battalion did not go into position under the single command of the battalion chief (the single exception being the evolution made by the Second Battalion at Sedan, already mentioned, to pass from its first to its second position), but the batteries went to the front, as they successively quitted the formation in column, in obedience to orders given by the battalion commander. These orders were the simplest possible. He, himself, directed the first battery and sent orders to the others to post themselves on the left or on the right of the first one. When the ground was open and there was no motive for acting otherwise, each of the succeeding batteries posted itself 200 or 300 paces nearer the enemy than the one which preceded it into action. This proceeding was the idea of Scherbening. He had employed it in 1866, at Blumenau, with success. By it the enemy, when on the defensive, is deceived. He will get the range of the first battery, and not reaching the succeeding ones with the same elevation will be obliged to get the range for them anew. Once solidly established it will be necessary to bring the batteries in rear into line with those in front in order that they may have a full sweep over the whole field of fire. This measure must be taken also because of the moral effect upon the men, for it does not produce a good effect to leave some batteries at a greater distance from the enemy than others.

Of course Scherbening's method can only be employed when first entering the field of action, and provided the ground is absolutely open, showing no undulations, as was the case at St. Privat.

At Sedan the crests of the heights ran between the valleys with banks sharply defined, imposing positions upon the artillery in a clearly defined manner, and here it was impossible to advance with the difference in the distances of 200 or 300 paces.

But I have allowed myself to make a digression. Let us return to the subject of the supply of ammunition.

The principle had been established that it was necessary *to expend first the ammunition in the caissons, and to preserve carefully the ammunition in the limber chests of the pieces as a last reserve.*

While it was possible to fire slowly it was required that each shell should be taken directly from the caisson, and to effect this one caisson was placed behind the second piece and one behind the fifth. It was only allowed to

take from the limber of the piece the first shell upon coming into action while the caissons were not yet in place ; and to use the supply in the limber chest when the order for opening a rapid fire was received. But as soon as the critical moment had passed it was required to fill the limber chest of the piece at once with ammunition from the caissons. The men who were seated on the caissons gave their assistance in doing this. As soon as one of the caissons was empty the wounded were seated upon it and the dead placed there (for it is best to keep the men of the battery from seeing their dead comrades as much as possible) and it was driven slowly toward the position of the second echelons of the battalion. The third caisson of the first echelon took the place of the one sent to the rear and at the same time a new caisson of the second echelon came up at the most rapid gait possible to place itself upon the wing of the battery which was in action. The second echelons of the battalion sent the empty caissons which came to them towards the ammunition train as soon as the train had reached its designated position to be there re-filled.

When in the course of the battles of St. Privat and of Sedan I traversed the line of batteries and inspected the limber chests of the pieces I found them filled to the brim. And when at St. Privat we advanced with the assaulting infantry and the batteries reached the height between St. Privat and Amanvillers which had just been taken, and then the position nearest the enemy close to and in front of St. Privat, the batteries came up always with the limber chests of the pieces filled. We very soon had occasion to see how necessary this was. Beginning at this moment rapid fire was opened many times and it was no longer possible to draw ammunition directly from the caissons. But as soon as the necessity for the rapid fire ceased the limber chests of the pieces were immediately filled from the caissons.

It is by proceeding in this way that, in spite of the enormous quantity of ammunition expended during the battle, we reached the evening without being embarrassed, except late in the evening in the case of those batteries of heavy calibre which had been in action longest, for the batteries of heavy calibre had less ammunition than those of light calibre. They expended the last shell in the last caisson and all that there was in their limber chests, for on this day the fifteen batteries of the Guard fired from 8,000 to 9,000 shells. But the ammunition train succeeded in removing this embarrassment, as I shall describe to you later.

Posting the carriages of the first echelon upon the same front with the battery presents, it is true, this inconvenience, that the battery requires for its front an extent of 200 paces, while that without it 120 paces will suffice. This measure can only be resorted to, therefore, when the necessary space can be obtained, as was the case with us at St. Privat, while at Sedan we had no emplacements of sufficient extent. But in all other respects this measure offers only advantages. Thanks to the more extended front the enemy is more enveloped by our fire. The distance of almost 100 paces which separates the piece on the left wing from that on the right permits the observation with great facility of the effect of the firing,—of correcting

the range more easily, —and of giving more room for the men furnished by the infantry to protect the batteries.

You will perhaps say that carriages so placed will be more exposed to loss than if stationed 300 or 400 paces in rear, but with rifled cannon the ground behind the pieces for a distance of 300 or 400 paces constitutes, because of the bursting shell, a field more dangerous than a position upon the left of the pieces upon the same line. The enemy's pieces fire upon the pieces of the battery and not upon the caissons on their flank and their practice is usually sufficiently good to render these caissons tolerably safe.

It has been proved that the carriages placed upon the same front alongside the batteries were less exposed than if they were posted in rear. During all the battle of St. Privat none of the caissons were blown up although I had limber chests exploded.

I have cited particularly the battle of St. Privat because we expended there the greatest amount of ammunition. At Sedan the fifteen batteries of the Guard fired about 5,000 shell. At no time during this last battle was it necessary to have recourse to the ammunition train to fill up the caissons.

Let us pass now to the method employed in refilling from the train, and in replenishing the train from the field depots.

The nine ammunition trains which followed each army corps were divided into two echelons of which the first, which included two infantry and one artillery trains (after St. Privat the opposite proportion was established), followed the army corps at the distance of half a day's march. The other echelon, which contained the six remaining trains, followed at a full day's distance. The chief of all the trains,—of the battalion of trains,—marched with the first echelon, and the daily orders by which his march was directed were transmitted to him by the corps chief of artillery, who received them from the general commanding the corps.

The distance at which the two echelons marched rendered the transmission of orders very difficult. It is perfectly clear that it was very difficult for the corps commander, who had to decide upon his course and formulate his orders in the evening, after the receipt of the reports upon the enemy's movements, to send in the course of the same night the orders concerning the next day's march of the trains so as to reach them in time, they being distant (including the depth of the column of march of the corps) from 23 to 28 miles. It is hardly possible that aides-de-camp or orderlies should traverse, in the night, distances of 23 to 28 miles and rejoin headquarters which will have perhaps advanced 14 miles in the interval. Success in regularly directing the march of the ammunition trains was not met with until the establishment of relays of couriers between the headquarters of the corps, that of the chief of the corps artillery, and that of the chief of the ammunition, extending finally as far as the second echelon of the trains. These couriers were changed daily and this line was sufficient for the regular transmission of orders, but the trains had to struggle without ceasing against difficulties of every nature, and to vanquish very great obstacles, for, in the rear of an army corps the road is required not only for the ammunition train, but for the bridge train, ambulances, etc., etc., to

such a degree that it is almost blocked. In the extraordinary case when an advance in view of a battle was made the aides-de-camp who were sent with orders evidently had very great distances to traverse.

Care was taken to impress upon the chiefs of the ammunition trains the obligation to make all the efforts humanly possibly in order not to leave the troops who were engaged without ammunition. They should, in case of battle, march upon their own responsibility and without awaiting orders.

As to the chief of the trains, his instructions were to report immediately, as soon as he heard or understood that a battle was about to take place, without awaiting any order, to the general commanding the artillery of the corps and to demand of him, as soon as he found him, orders concerning the point at which he should post his trains. The order indicating this point was communicated to the infantry divisions and to the artillery of the corps during the battle, so that they might know where they could get their empty caissons filled.

But it became absolutely impossible to give regular direction to the ammunition trains when several corps followed each other on the same road, and when each of the corps with its troops alone occupied a depth of 14 miles. In such a case it was absolutely necessary that the chief of the trains should execute his task, even though it should require superhuman effort, and should attempt to follow his batteries and do his utmost to rejoin them as quickly as possible, and to do this that he should act upon his own responsibility without awaiting the receipt of the special orders of the day. Let me tell you how these brave officers comprehended and fulfilled their duties.

At the moment when our armies in 1870 were concentrated in the West the railroads were so put under contribution by the troops of the fighting line that it was found to be impossible at first to send with each army corps more than three ammunition trains, or the first echelon. The dispositions for the transportation of troops were made by the railway section of the general staff at Berlin, and the generals commanding the troops had nothing to do with them, and were not informed of the several movements, because they were liable to undergo modifications to accord with the enemy's movements which it was absolutely impossible to foresee. It was only when the troops rejoined their chiefs that they could dispose of them.

We (the headquarters of the Guard Corps) had been landed on the 1st of August on the platform of the depot at Mannheim. We passed the 2d of August in that city. On the 3d we went to Durkheim and on the 4th to Kaiserslautern. Just as we reached this city the three ammunition trains forming the first echelon were debarked, after which the cavalry division of the Guard and the corps artillery left the train at the same place. I had then at my disposition at least the first echelon of my ammunition trains, but the commandant of the battalion of trains—Major Von Heinecius—was not there. He had received orders to conduct the six remaining trains from Berlin by the highway to Wittemberg where they were to take the rail. That is all we could learn of those six trains; we had no other news of them until the 15th of August. It was very difficult to direct the

march of the three first trains for the three army corps marched upon a single road. The corps which followed us barred the road to the train, and nevertheless, it was a necessity that they should follow us. How many collisions and interferences were there, there? Even at night the road was scarcely ever free for them. It was only after the deployment upon the enemy's country was accomplished, that is, on and after the 9th of August, that these three trains could advance regularly.

On the 15th of August a report was received from Major Von Heineccius announcing that on the 14th he had reached Sarreguemines with the six remaining trains. On the 6th of August he had been placed on a railroad train and had quitted it on the 8th in the vicinity of Mayence. There no one could give him any precise information as to the point towards which the Guard Corps had been sent, and therefore he committed himself to the care of Providence and marched westward until he should find the trace of his corps.

According to his report he intended to take the columns on the 15th as far as Verminy, near Morhange; on the 16th to Nomeny; on the 17th to Dieulouard. If you will take the trouble to follow upon the map the march from Mayence to Dieulouard you will agree with me that such forced marches, executed by small bodies of raw troops, merit the greater praise in that the trains had no orders at all, but went toward the front upon their own responsibility, moved only by their zeal for the Service.

Early in the morning of the 16th of August, Major Von Heineccius, who had come on in advance of his command, presented himself to the general commanding the Guard Corps, and on the evening of the 17th the corps orders mention for the first time the second echelon of ammunition trains.

It was certainly greatly due to chance that on the evening preceding the day of the grand decisive battle it had been possible to give for the first time regular orders for the last part of the corps which had left the railroad, and that thus the replacement of exhausted ammunition from the trains was rendered possible.

On the 16th of August the headquarters of the corps reached Bernécourt; the first echelon of the trains, Manonville; the second, as I have already stated, Nomeny. For the 17th of August the corps was ordered to reach the Meuse; the first echelon was directed upon Apremont, while the arrival of the second echelon was expected that evening at Dieulouard.

As we know, the events of the 16th forced the Guard Corps to take on the 17th a direction toward the north. Thereupon the trains of the first echelon were ordered from Manonville to Limey by an order modifying the first one, dated 3 A. M., August 17th, and brought by an aide-de-camp. By the orders given the Guard Corps on the evening of the 17th, which required that the Guard should be reunited on the morning of the 18th at Mars-la-Tour, the ammunition columns were so directed that the first echelon should reach Sponville at 7 A. M., and the second reach Thiancourt at an hour not fixed.

On the 18th, shortly after the first cannon shot was fired, the commandant of the ammunition trains reported to me and demanded orders. I decided at first that the trains should advance as far as Doncourt, and I posted them

behind and within reach of the Guard Corps, which was then fully engaged. This station was made known to the infantry divisions and to the artillery of the corps.

At the beginning of the battle, therefore, I was filled with a sense of assurance and of security, for the results of the practice firing which we had just finished, before taking the field, had shown me that the batteries had learned their lesson perfectly, and that they would be invincible,—that the effect they would produce would be irresistible,—if there was no failure of ammunition; and the full supply seemed now to be assured. But in the course of the long cannonade, General Von Colomier, Chief of Artillery of the Army, came along the line of batteries and warned me that he had assigned all the artillery ammunition of my first echelon to the III. and X. Corps. “They expended yesterday,” he said, “such enormous quantities of ammunition that their own trains are not able to make good the deficiency.” Imagine the terror which seized me! I had engaged in the most violent struggle, and in the midst of it my most vital organ was taken from me. In spite of this I could not, in my own mind, say that the general was wrong. *He* had to provide for the whole army, and of what use would the batteries of the III. and X. Corps have been if they had no more ammunition? Could he know in advance which batteries would expend the most ammunition this day? This news caused me a disappointment so much the greater as, a few minutes before, the commandant of the trains had left me for the purpose of causing his caissons to advance to the position assigned them between Habonville and Batilly. When he returned to me he made a report which consoled me somewhat. He told me that he also knew of the orders given by General Von Colomier, and that he had immediately sent to Thiancourt the order to the second echelon of trains to push to the front if it be possible as far as the first echelon. Yet I could hardly hope that they would reach us on this day. They had actually reached Dieulouard the evening before after the different forced marches that they had been obliged to make since their departure from Berlin. From Dieulouard they had traveled 14 miles to Thiancourt, which was distant from the field more than 18 other miles.

Let me state in passing that after having made his report the commandant remained with me in order to see upon what point the ammunition was giving out. Then he accompanied the Battery Prittwitz, which he had commanded in 1866, upon the height of St. Privat, where it was the first to open fire, as I have before stated. The trains of the second echelon accomplished more than we had dared to hope from them. They had not awaited the order to continue the advance. The uproar of the gigantic battle had made itself heard as far as Thiancourt and they had therefore continued the march. Two ammunition trains (Planitz and Keudell) marched straight to the field of battle, and, breaking a road with the greatest possible energy through all sorts of vehicles of the supply trains, ambulance trains, parks of carriages, etc., which covered the roads, they succeeded that same evening in furnishing ammunition directly to the batteries, to each of which they sent one caisson or two. It is in this way that the threatened embarrassment was evaded, but they succeeded only by dint

of the energy they displayed, by the independence with which they knew how to act, and their foresight as to the needs of the batteries. The next day, at day-break, the transfer of ammunition to the limbers of the pieces and to the battery caissons was made, and by 2 o'clock in the afternoon all the five artillery ammunition trains were entirely empty.

I have already had occasion to say to you that for this operation the batteries had no writings to make. They sent simply their empty caissons to the trains; there they filled them. The conductor indicated the number of the battery for which the ammunition was destined and signed a receipt.

But our trains provided for still another deficiency. The batteries had lost 275 horses and the reserve horses were not sufficient in number to replace them. The trains gave us 200 animals, for but a small number of horses were required to draw the empty trains, and they were at liberty to fill up their number during the return march by requisitions. They also gave us officers. Many of our battery commanders had been killed or severely wounded. The officers commanding the artillery ammunition trains, who, to the number of four, belonged to the regiment of field artillery of the Guard, took command of batteries. To replace them we took the officers of the reserve, of the cavalry of the Guard who had been assigned to us as auxiliaries and who in the interval had been instructed in the service of the trains. They were assigned to the command of the ammunition trains.

A certain pedantry inherent in all officers who have served a certain length of time made me fear at the outset that these officers would not be apt at fulfilling their duties. But results showed that no better choice could have been made. In peace time these gentlemen, in their quality of great landed proprietors, had acquired great facility in the management of men and horses. They understood harness, they were accustomed to act with independence and upon their own responsibility, and this is what was often required of them when they were without orders. For the preservation and care of the ammunition, and for keeping the accounts, the column had its man specially detailed.

I very soon discovered what excellent results these commandants were able to achieve. As soon as they had disposed of their ammunition they retraced their route. The first of them started back on the afternoon of the 19th of August.

To give you a complete idea of the mechanism of the service of replenishment there remains to speak of the method employed in furnishing the ammunition to the trains from the depots.

During the battle of St. Privat General Von Colomier's assistant had informed me that the reserve park of field ammunition of the Second Army had followed the army to Herny, east of Metz, and that the trains could obtain their new supply there. The artillery trains that we had emptied, to the number of five, were directed upon Herny and an infantry half-train went with them, for the foot soldiers had had, comparatively, expended a small amount of ammunition. The commander of the battalion of trains remained with the three and one-half trains which followed

the corps. The battalion staff, from the receipts given by the conductors of caissons, ascertained the amount of ammunition remaining on hand and made requisition upon the established forms for the amount necessary to refill the empty trains. These requisitions were sent by the chief of artillery of the corps to the general commanding all the artillery of the army so that he should send to the reserve park the order for the necessary issue. At the same time the corps chief of artillery notified the park by the field telegraph of the amount of ammunition required. The matter was arranged, therefore, so as not to lose a moment, while at the same time the accounts were kept exactly and with minuteness. Supervision over the batteries was exercised by unexpected inspections of the caissons and limber chests, so that it was certain that the full supply was really on hand.

But the refilling of the trains did not proceed so easily. They sought to reach Herny in going by Pont-à-Mousson. But at Herny they obtained—nothing at all! I suppose that the ammunition which was accumulated there had been exhausted to replace the enormous quantity which had been expended by the first and second armies in the three battles around Metz, for it must not be lost to sight that in this war the number of pieces which fired and the amount of ammunition expended reached to figures of which we had no idea in preceding wars.

My trains then continued their route and finally found the supply of which they were in need at the Prussian fortress of Sarrelouis.

They then marched westward. They learned that the Guard Corps formed a part of the Army of the Meuse and set out to find it,—found its trace, and followed it up making forced marches, and all this they did without having received a single order of march, for the staff of the Guard Corps never knew exactly where the trains were.

When do you think they rejoined the corps?

As for myself I thought I was dreaming when, on August 29th, I was informed that the first of the trains had reached the corps. On the 31st of August, that is, the evening before the battle of Sedan, they had all arrived. The first train had then travelled 210 miles in ten days; the last train had made 233 miles in twelve days. But of these ten or twelve days it is necessary to deduct the one in which they received the ammunition and loaded their caissons.

On the 1st of September the trains reached the village of Villers-Cernay, where they proceeded to refill the batteries, a part of them the same evening. I have already said that at Sedan we fired but 5,000 shell, that is, we had not expended all the ammunition in the possession of the batteries. but the bombardment of Montmédy on the 4th of September cost us again almost 4,000 shell, and on the 6th of September all the artillery trains were again entirely empty. They retraced their steps again by Saint Mihiel and Pont-à-Mousson, and again, in great part at least, had to go as far as Sarrelouis, from which place they started again to rejoin the army. When we arrived before Paris on the 19th of September, the first of the trains (Räbel) had already rejoined the corps. Between the 6th and 19th of September—14 days—it had marched over 326 miles. It had made an abso-

lutely enormous march, which will appear the more astonishing yet if we consider that it was often necessary to stop on the road, or that the way was obstructed and that it was necessary to make up for lost time the next day by making a still more considerable march.

I was not desirous of knowing how many horses were left along the road, which it was necessary to replace by making requisition upon the country. I did not push the spirit of control so far as to inquire how many times, and for what length of time the men forming the escort were taken up on the wagons and what distances were thus traversed at a square trot. I was too happy that the ammunition should have arrived and that the trains had both teams and equipments complete. In truth they had not lost much time along the way in seeking lodgings of the quartermaster. They marched in the morning, they marched in the afternoon; at noon they made soup in bivouac, and they passed the nights for the most part in villages situated far from the main routes where their escorts performed the necessary guard duty.

The engagements which followed were not so violent that the supply of ammunition presented any great difficulty; besides, at this time the park of field ammunition had been transferred to Épernay.

In spite of the fact that in all the battles in which I have taken part during the War of 1870-71 we always succeeded in renewing the supply of ammunition in time, I have none the less become convinced that the quantity we transport with us—with the batteries as with the trains—is not sufficient.

We could not be certain, and that particularly in the principal battles where great masses of troops were assembled with a view to striking a decisive blow; we could not be certain that the trains would succeed in breaking a way through to the fighting line on the same day on which the battle was fought.

For this reason we should furnish the batteries in their caissons and limber chests with as much ammunition as they can expend in a battle lasting a whole day. We did not have this amount in 1870. On the 18th of August we were not engaged till after noon, and nevertheless we had to have recourse to the trains that evening to avoid embarrassment. I am sure that the supply would have been insufficient if we had been engaged from early morning. I also estimate that the quantity of ammunition carried in the trains in 1870 was insufficient. After the expenditure of ammunition made on the 18th of August all the trains were empty. If this expenditure had been greater, which, as I have said, would have been the case if the battle had begun earlier, there would not have been in the trains the quantity of ammunition needed to fill up the batteries for a new battle. But it was necessary that they should be filled with a view to this possibility in order to avoid tying the hands of the general-in-chief for all the time that the trains were seeking a fresh supply.

The question has been raised, since the war, as to what reduction could be made in the quantity of infantry ammunition transported in the trains, having in view the facts that in all the War of 1866 there was fired only a mean number of from seven to eleven cartridges per man; and that in

1870 but a small number of caissons of infantry cartridges had been used when all the artillery trains had been emptied.

But it is not possible to draw from this experience a clearly defined conclusion.

In 1866 the surprise caused by the efficiency of our breech-loading muskets led usually to a very rapid decision of the fight so that the infantry combats were of short duration.

In 1870, on the contrary, our brave infantry was obliged the greater part of the time, to endure patiently the fire of the enemy's musketry whose range was greater, so much so that it was not possible to reply.

When a struggle shall take place between two infantries whose armaments are equally good, there will be a greater expenditure of ammunition on our part than during the last two wars.

To be able to form an opinion on this subject, it will be necessary to disregard the experience gained in these wars and to look at the matter from another point of view.

I told you in one of my former letters that I once caused a company on the war footing and a battery on the war footing to open a rapid fire, side by side, on the firing ground; the firing being properly directed and done by instructed men; and that the two arms expended quantities of ammunition approximately equal both as regards weight and cost. It is the weight which plays the decisive part when the subject considered is the supply of ammunition.

If we admit that the two arms may be engaged all day and that they keep up a rapid fire, violent but properly directed, we must reach the conclusion that each of the companies will expend, as regards weight, as much ammunition as each of the batteries.

An army corps contains 25 battalions, or 100 companies, and 19 batteries, and therefore five times as much infantry as artillery ammunition will be required. But the artillery will expend proportionally more because it will fire at greater distances and consequently for a longer time. It may be admitted that the range of artillery is five times superior to that of infantry, and for this reason a battery will use in battle five times as much ammunition as a company. My conclusion is that we shall be obliged in future to supply an army corps with as many trains of infantry as of artillery ammunition.

If you wish to know the proportion between the number of rounds of shell and of canister which will be required, I think the figures given by the war of 1870 will still hold good. The batteries of the artillery of the Guard expended throughout the whole war about 25,000 shell and one round of canister. This last was broken in transportation.

If you think that I have written at very great length upon this question of the supply of ammunition, please consider this: with ammunition, the artillery on clear ground is invincible in its front; without ammunition, the pieces are but impedimenta for the army to which they belong and trophies for the enemy.

THE NEW GUNPOWDER AND GUNS.

By MR. JAMES A. LONGRIDGE.

(Reprinted from *Engineering*, London.)

WITHIN a recent period very interesting statements have been made with reference to the efficiency of our naval armaments and the most recent developments of gun construction and gunpowder manufacture.

Among the former is the excellent letter of Admiral Mayne, in the issue of the *Times* of September 21st. Most cordially do I agree with him in his deprecation of monster guns afloat. No larger gun than a 12-in. or 12½-in. of about 50 tons is required, and such a gun will pierce any armor, now afloat or likely to be so, at 1,500 yards, a distance beyond which it is practically useless to fire against armor. Such guns may be mounted on disappearing carriages, as has actually been done on the Russian warship *Catherine II.*, the heavy guns of which are mounted on Anderson's disappearing hydraulic carriages.

One can only contemplate with dismay the fate of our 110-ton and 67-ton guns mounted *en barbette*, or even in turrets, exposed to the fire of such a vessel as, for instance, the *Piemonte*, pouring out a storm of twenty-four projectiles of 100 lbs. each and thirty-six projectiles of 45 lbs. each, or sixty projectiles per minute, any one of which, by a fair hit, would put one of the large guns out of action!

Questions were asked in the House of Commons in August last as to the effect of 4.7-in-quick-firing guns firing upon the large guns mounted *en barbette*, but the only reply elicited was: "The subject has engaged the serious attention of the Ordnance Committee, and that experiments have been tried, but that in the interests of the public service it is not desirable to make public either the results or the opinion of the Committee;" to which was added on the following day: "It has not been found practicable to give the chase of these guns greater protection, but, as they will usually be pointed towards the enemy, they will present a comparatively small target." But what if there should be two or three enemies approaching from different directions, or if one of the 180 projectiles per minute should find its way into the 16¼-in. diameter muzzle of a 110-ton gun? Why, even if a 3 lb. shot were to do so it would certainly disable the gun.

I believe every naval officer will agree with me that the length of the modern guns is a very serious inconvenience. It is due chiefly to the alteration which has been made in the powder. The "spirit of artillery," as it was called by General Brackenbury, has been so emasculated that high muzzle velocity can only be obtained by large charges and long guns. The late trials of the quick-firing 6-in. guns have been put forward as evidencing a remarkable improvement in the manufacture of powder, and at the recent general meeting of the Elswick Ordnance Company, Lord Armstrong

referred, in eulogistic terms, to the performance of the 6-in. quick-firing gun and the Chilworth smokeless powder.

In the published accounts of the trials of the *Piemonte*, it was stated that, with this gun and a charge of 38 lbs. of Chilworth powder, a muzzle velocity of 2,300 ft. per second was imparted to a projectile of 100 lbs., whilst with the Service 6-in. gun the velocity of the same projectile with 55 lbs. of brown powder was only 1,970 ft. per second. But it was not pointed out that the new gun was 40 calibres in length, whilst the Service gun with which it was compared was only 26 calibres, being an excess of length of not less than 7 ft.

To make the comparison fair as regards the powder, the service gun should be of the same length, in which case it would have given a muzzle velocity of 2,340 ft. per second. Of course in the above case it must be admitted that it is shown that 38-lbs. of Chilworth powder was equal to 55 lbs. of brown powder, but the question may fairly be asked what would have been the velocity with 38 lbs. of a strong powder such as pebble? My answer to this is, that in a 6-in. gun of 40 calibres in length with 38 lbs. of pebble powder and a 100-lbs. projectile, the muzzle velocity would be at least 2,600 ft. per second.

Another way of stating the comparison is this: What would be the length of a 6-in. gun to give the same velocity with 38 lbs. of pebble as would be given by the new quick-firing 6-in. gun with the same charge of Chilworth powder? The reply to this is $22\frac{1}{2}$ calibres. Consequently the respective lengths of the guns would be:

	ft.
New gun with Chilworth powder.....	20
Ordnance gun with pebble "	$11\frac{1}{4}$

Of course the increased effect of the short gun implies the greater strength of the pebble powder. No actual pressures are given in the reports of the *Piemonte* trials, but Lord Armstrong speaks of these as "very permissible pressures." I presume about 15 to 17 tons per square inch. Now the pressures with 38 lbs. of pebble would be about 28 tons per square inch.

What is a "permissible" pressure depends solely on the strength of the gun, and it is perfectly certain that by the adoption of wire a gun may be made which will be less strained by an internal pressure of 28 tons than a forged steel gun of the same calibre with a pressure of 17 tons. The fact is, that the present weak powders are a necessity for weak guns, and the excessively long guns are a necessity for weak powders.

I have for long maintained that our ordnance authorities were on a wrong track, that of weak powder, heavy charges, and long guns. I do not expect that the repetition of my opinion will have any effect, but possibly the stern logic of facts may at last drive the lesson home. Already we have the experience of the 110-ton guns of 30 calibres. We are informed that the new 6-inch quick-firing gun of the *Piemonte* is 40 calibres in length, and it is said that guns of even 50 calibres are contemplated.

For land defenses such guns may be useful, but they must be made much heavier, and especially in front of the trunnions, than any gun now made.

For naval purposes they are utterly unfit. I am satisfied that a 12-in. gun about 25 ft. long and weighing about 50 to 60 tons, and mounted on a disappearing carriage, is the heaviest gun that ought to be put on board a battle-ship. Such a gun, fired with a powder of about one cubic inch grain, would give to a 1,500-lbs. projectile a velocity of 1,830 ft. per second at 1,000 yards from the muzzle, and this would have the same energy per inch of circumference, and consequently the same power of penetration as the 1,800-lbs. projectile fired from the 110-ton guns of the *Victoria*.

It is greatly to be desired that the whole question be reconsidered, in the case of our new battle-ships, before it is too late.

LETTERS ON INFANTRY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by LIEUT. ODON GUROVITS, 11th U. S. Infantry.

VII.

THE COMPANY OFFICER.

THE contents of my last letter naturally caused me to consider the importance of the line officers, *i. e.*, the chief of the company and his lieutenants. They are actually the soul of the complete executive and instructive infantry unit.

The same can be said of all the other arms of Service, but taking into consideration that, in computing the strength of bodies of troops, cavalry is computed by the number of horses, artillery by the number of pieces, and infantry the only arm of Service computed by the number of men; everything indicates that, with the latter arm of Service, the human psychological element is the only decisive one, and the influence upon the individual man is more preponderant in this case.

This influence, the forming of the individual mind, has its origin only with the chief of the company and his lieutenants (*i. e.*, the company officers). The non-commissioned officers are simply their assistants; they are created by the company officers and execute whatever may be ordered by the latter.

Again, the field and higher officers are too remote from the men, and on account of the great number of men, cannot be familiar with the peculiarities of each individual man. The company officer alone knows: Peter, Kunz, Meier, and Müller. He instructed the men, praised and reproached, rewarded and punished them. This is what causes the soldier to follow the officer confidently in battle; and the officer best known to the soldier is the one who carries him away in action to perform deeds of bravery.

Who has not witnessed examples of this kind? At the redoubts of Düppel, while skirmishing with the enemy's outposts, it was intended to surprise the enemy by attacking him after dark in his rifle-pits, expecting to occupy the latter with our outposts.

On the 2d day of Easter, 1864, it happened that the companies of the 18th and 8th regiments rushed past these pits, instead of intrenching themselves therein; and at daybreak they found themselves at the front of the earthworks, unable to find shelter, from whence they were then forced to retreat with considerable loss. A soldier born in Upper Silesia, when asked and reproached by his land-holder, who was present in his capacity as a Knight of St. John, why they had advanced so far, answered, in his broken German: "But if Lieutenant runs ahead, one must run along."

In a fight in and around a village near Paris, half of a company had occupied a cemetery alongside of the village. The regiment to which this company pertained, had up to that time, always performed wonders of bravery. The enemy, however, upon attacking, took the cemetery within a remarkably short time; this surprise was felt deeply by us and we had to storm it again. After the engagement was over I spoke to men pertaining to the force which had first occupied the cemetery, trying to ascertain the causes which had led to its occupation by the enemy. The men answered candidly: "Yes, we did not have any officer to direct us what to do, therefore we went away." Unfortunately, the hostile artillery fire had placed both officers *hors de combat* at the beginning of the engagement. One of them had been killed, the other wounded and unconscious. These are examples enough.

Every infantry officer, who ever witnessed an engagement, can cite many more to prove that, in our Army, the company officer is the soul of that arm of the Service, and that he inspires it with *esprit*. And with what unconditional confidence do our men follow their officers!

General Von Rchel said in the last century: "The spirit of the Prussian Army rests with its officers."

The truth of this statement is more apparent since the fighting infantry masses, at the decisive moment, must dissolve themselves into atoms which can be controlled by the lieutenant's voice only. Although I referred in my second letter to the fact that one is justified in believing that it was not the Prussian school-teacher, but the Prussian non-commissioned officer who won our battles; now, my meditations almost force me to the conclusion that it was not the school-teacher, not the non-commissioned officer, but the Prussian lieutenant who won our battles.

Of course the lieutenant is, year after year, the school-teacher of the men.

By making this statement, it is not intended to detract from the merits of the higher officers, and I anticipate that, further on, I shall come to a different conclusion. Even within the limits I intend to observe to-day, all misinterpretation of the above somewhat paradoxical sentence might be removed by observing that all higher officers once were lieutenants, and that all lieutenants expect some day to be promoted to the higher grades.

To-day we will confine ourselves mainly with the lieutenants, or, better still, with the company officers (including captains) of infantry. And we now ask ourselves: To what is due this influence [wonders of bravery producing] upon the masses who, in time of greatest danger, obey the gestures of their officers, notwithstanding that the loosening of the close order, due

to the new mode of fighting, withdraws the individual man from their control and supervision?

This influence depends upon the officer's indefatigable energy, his untarnished honor, and his Spartanlike contentedness.

There were times in peace when the duties of the officers consisted in doing guard duty, and in the spring and summer to drill a few hours daily, or to run across the fields during the manœuvres. These times originated the nick-names given to lieutenants, such as street-loungers, and others still common in the people's language. When do you see now a lieutenant on the street seemingly idle? At the most at noon, when he seeks the lunch counter, while the men eat their meals, and again at 3 or 4 o'clock going to dinner, and on Sundays when he employs his time to make social calls. At other times he is constantly busy. As soon as the sun rises in the horizon he has to inspect the men, see whether they are neat and clean, and correct them when the occasion requires. Then he has to instruct and drill each individual man—gymnastics, setting-up drill, mechanism of the rifle, rifle practice, field exercise, internal administration; everything is taught, and in everything the officer must be a model himself. The men will only learn what the officer excels in. Thus he is occupied constantly during the whole day. Any one glancing now and then at the drill on the drill-ground thinks that a few hours ought to be sufficient to master that little drill. The infantry officer, however, knows how much pain and labor it takes, and any one who reads my former letters without prejudice will see into it likewise, even if he is no soldier. Consider the time which must be spent at target practice. A company fires about 15,000 to 20,000 shots at the targets a year and no shot is fired except in the presence of an officer. The latter is held responsible for the necessary precautions and he has to see every shot recorded in the individual target record books. It is very seldom that a company has more than two officers available for this duty.

What claims upon the nerves, perseverance and sense of duty of the officer who stands for hours, regardless of weather, winter and summer, without neglecting to pay full attention to each shot fired, to the pointing of the rifle, the aiming precautions, and recording! Should he violate any regulation, neglect any precaution, it might easily result in an accident and a court-martial would follow. Then consider that often these duties are executed by the officer while having to contend against the ill-will of the population, even that of the civil authorities. It happened that mayors had the audacity to forbid target practice, officially, on account of a shot fired prematurely while the muzzle of the rifle pointed high into the air and the bullet struck the grounds beyond the target butts. The dangerous zone of our present rifle is great; we had in battle accidental casualties at a distance of 4,000 paces from the enemy's skirmish line.

Many think that the lieutenant can rest after he has finished his morning and afternoon duties and goes to dinner at 4 o'clock. On the contrary, dinner over, and he again meanders to the barracks to give theoretical instruction—one teaches the non-commissioned officers, the other, the men. It is true that in the *Fliegende Blätter* the soldier says: "The theoretical

instruction is that instruction which is not practicable," but the lieutenant enjoys the joke and laughs at it heartily, especially as he knows how seldom this definition is applicable.

This instruction, as far as military matters are concerned, is compulsory and yet it extends beyond mere military matters—much is taught which is of the highest importance to man in his civil pursuits and the few joining the ranks, not able to read and write, learn it while with the colors—Many learned more while with the colors than they did during their early school-days. I remember, while serving as a lieutenant, a recruit who, though bright and talented, had his early education entirely neglected. I taught him reading, writing and arithmetic; in later days he was promoted to be sergeant and finally made an excellent auditing officer in civil life. The results achieved, due to instruction while in the ranks, are more satisfactory than while in school. The men at the age of 20 and over, see the advantage of education quicker than when schoolboys and are more settled down. Therefore, they become more attached to their teacher and obey his authority in time of privation and danger, when the example is set by the teacher. All this does not even exhaust the lieutenant's duties. In addition to his practical duties, he continues to increase his professional knowledge. He must keep up gymnastics, he must study, lecture, attend all of the lectures delivered in the regiment, write scientific essays, and take part in the "tactical Kriegsspiel."

After the instruction of the men, the remaining hours in the evening are thus disposed, three or four times during the week and the other evenings only, are available for his recreation and are spent mostly with his comrades.

Thus the requirements of a line officer increase to such an extent, that those who succeed to be detailed for a course at the Academy of War, can consider this deep and straining study as recuperating after the hardships of the service with the line. Among the company officers, the chief of the company is even more confined on account of his duties. He shares the hardships of his officers and, while the latter attend to the instruction in detail, he must go from one to the other, superintend, teach and instruct the young, inexperienced lieutenants. After his day's work, upon reaching his family and home, he might intend to rest for an hour or two, or he might desire to devote the same time to his family, but only too frequently does it happen that his orderly sergeant reports a case of insubordination which requires careful investigation, or punishment; in the latter case a lengthy entry to be made in the record of punishments awarded. At another time he has to settle some accounts for his company, again he is required to go to the company clothing store-room to see after the tailors, or some irregularity noticed in his squadrons requires investigation, etc. He is held responsible for the smallest details and is supposed to know everything relating to his company and men. It is proverbial that a company chief is unable to enjoy his existence, never being secure from interruption. I am aware that the officers of like grade of the other arms of Service are busy in a like manner. The infantry lieutenant, however, at the time of the greatest strain, during the drills and manœuvres, walks while the cavalry

and artillery officers are mounted ; the expenditure of physical power, therefore, is greater with the former officer.

These efforts and exertions alone would not be sufficient to exercise such an important influence upon the masses, which is due to the officer's cherishing his untarnished honor above everything. The private knows of this, and also knows that he can depend upon the unblemished honor of his officers unconditionally.

The soldier acknowledges that, in regard to honor, the officer stands far above the soldier ; he does not stop to question it, knowing that the officer will always and everywhere set the best example, and that, in order to keep his honor untarnished, he will be the leading one always in time of danger. Thence comes the feeling of impossibility to abandon an officer in danger, and thence the *esprit* of the men expressed above, " If Lieutenant runs ahead one must run along."

One could write volumes should any one desire to exhaust everything relating to the honor of the officers. It would, however, be like carrying owls to Athens, should I try to inform you upon this subject. The high standard of the officer's honor is the object of the respect of every educated citizen as well as the object of envy of all those who desire to undermine existing social and political conditions. How the latter howl and rejoice when one of the ten thousand violate this untarnished honor. How they fill columns of newspapers for a length of time with it, attempting to throw this blemish upon the entire profession ; nevertheless, it is useless, I say, since the profession remains honorable. It banishes such offending individuals without pity and forever from its ranks, and it gains in respectability by such regardlessness and candor ; not clothing itself with a hypocritical dress, but displaying its inward uprightness.

The best testimony to prove the untarnished honor of the officers, is the bitter envy of those men who, devoid of all honor, try to undermine everything which was hallowed by family bonds as well as by the fatherland.

Those who, though not soldiers, respect these bonds, may be relied upon to give a candid answer.

One will hear, then, how they envy the preferred class of officers, but every citizen esteems it an honor if any member of his family pertains to this class and every one is pleased to have officers visit his house and family, and every public resort where officers congregate is accepted unconditionally as respectable.

I know very well that, as far as the infantry officer's honor is concerned, that of the officers of other arms of Service is on the same level, and I do not infringe upon the honor of any officer by making this point conspicuous with infantry. But the infantry represents the masses, and, furthermore, it comes first with regard to the third point raised : " The Spartanlike contentedness " which, in spite of all the hardships, is the expression of probity. It is true that many cavalry officers are just as contented as those of the infantry, but it is admitted that those officers who have private means prefer to join the cavalry, *i. e.*, such officers do not submit to the hardships mentioned.

On the other hand, by far the greater part of the infantry officers are poor, very poor, and the salary intended to reward their indefatigable energy is exceedingly inadequate, so inadequate that our great statesman, while representative of the people, spoke of the splendid misery of the lieutenants. Now, the allowances of our lieutenants are so scant that any one without private means will meet bitter privations, which he suffers quietly by himself in his hamlet, yet in public he is expected to and does satisfy what his social status demands.

It cannot be denied that many families find means to provide for an allowance to their sons intended for a military career. Many, however, cannot do so. I accepted many candidates from the corps of cadets whose mothers (officers' widows) could do no more than provide the paltry sum of five thalers once forever to start their son in his new career, and perhaps an old coat which in its best days had been worn by his father. Others, members of old noble families, could not even provide this, although their sisters expected to be assisted out of the lieutenant's salary. It often happens that an officer invited to a sociable tea develops much mirth by his voracious appetite. In later days, when the same officer is better off, he will admit that this appetite was due to the fact that not having had the means he did not partake that day of any food until tea. Again another, to provide supper, will buy the bread issued to his servant, who, possibly, is a wealthy farmer's son, pretending that it is beneficial to his health to eat such bread ; the truth, however, is that it is the cheapest bread.

It is not necessary to mention that such officers freeze in their home in winter, not having means to buy fuel ; nor do they wear an overcoat in order to save the wear and tear of their blouse or coat, of course, pretending that they cannot bear warm clothing. If it is required to appear at parades, on the street or to attend a social gathering, these Spartans are the ones who will surpass in elegance of appearance and cheerfulness. Do not interrupt me by saying that there are exceptions to the rule, that there are officers who are contaminated by the universal desire for luxury, who squandered theirs and their family's fortune, and who, finally, are crushed by debts. Why should an officer not once in a while be attacked by the universal weakness ? But these exceptions prove the rule, and the sensation caused by these exceptions speaks better for it than the Spartan-like conduct of our lieutenants.

What, then, does the private think of such officers ? It is not pity but respect which he feels. The soldiers are sure to be informed about the private life of the lieutenants by their servants, who are the men's comrades, and if the private sees that the lieutenant is paid less in proportion than the soldier, that the officer cannot afford to spend money for recreation and pleasure, but still remains his teacher in knowledge, an example in danger, why should the soldier not try to rival him ?

It is true that the lieutenants receive poor pay—a skilled mechanic, be he locksmith, carpenter, shoemaker, or cabinet-maker, earns more in a week than the lieutenant receives. I do not mention professions requiring special technical knowledge which earn more still.

Why then does the Spartan stick to his profession ? What causes him

to spend his means for an education that would open to him any career in order to prepare himself for a profession that necessitates a never ceasing activity in Peace and risk of blood and life in War, and all this without reward? It is but the strife for honor and glory, and the exceptionally honorable social position which he occupies in society, entirely due to his untarnished honor. As long as officers, even lieutenants, continue to possess this extraordinary honorable position, admitting them, although young, into every social circle, the profession is going to continue to exercise the same attraction upon the educated elements of society—abolish this social position and the highest salary could not replace the ensuing loss. Any one living but for money and sensuality might say, with Falstaff: "What is Honor? Air!"

The preferred social position occupied by officers in Germany is naturally the object of envy of all other classes, and, therefore, officers, especially some twenty years back, were frequently attacked. After these attacks made on the officers as a class, had rebounded without any impression, attempts were made to ridicule it. In consequence of the victories in our latest wars, this animosity diminished very much.

Upon my arrival in Berlin after the War of 1866, a merchant and well-meaning citizen asked me: How it was that the citizens of Berlin up to that time thought the officers of the Guards to be clannish and haughty. They feasted them, thinking it proper to do so after having achieved such a grand victory, and they found them to be the most amiable, modest, and educated men in the world.

I could answer this good man only by calling his attention to the erroneous opinion which the people in former times had of the officers of the Guards. Another reason why the animosity against the officers is diminishing is the institution of the class of officers of the Reserve.

As soon as the universal conscription bore its good fruits, it became natural for every educated, honorable young man, who did not serve a few years in the Army as an officer, to try to be commissioned as an officer in the Reserve. Why, then, should there exist an animosity against a class to which he pertains conditionally? How could the Nation in Arms attack its own leaders?

It is true that the affected lieutenant of the Guards sometimes appears still twisting his sprouting moustache, talking with a nasal twang and never without an eyeglass. He makes his appearance upon the stage of the world from time to time, generating universal mirth,—he is not necessarily always of the Guards. Should he once in a while seek to appear as the champion of his profession's honor we must not forget that experience teaches that just such persons, at the moment of greatest hardships and danger, make it a point of honor to be a success, and that they are then not to be found in the rear. Although at times such a person may provoke much ridicule, still there is much in him to demand our respect.

I do not know why I write all this to you who know all this as well as I do.

Well, after hearing the attacks made last year in the "Reichstag" upon the honor of the Army, I think not one of us should be silent whenever

an opportunity offers itself to give testimony in behalf of the matter and to express the desire that this *esprit* might be preserved for a long time to come in our Army.

I intended to examine the causes which led to the success of our infantry and I have found, as one of the important causes, the *esprit* of the corps of officers which finds itself expressed in its indefatigable energy, its untarnished honor, and its Spartan-like contentedness.

Military Notes.

A NEW INFANTRY SIGHT.

EVERY officer of infantry, must often have experienced the great difficulty of teaching men to aim the rifle with the same amount of foresight. We are all of us familiar with "full-sights," "half-sights," and "fine-sights," and, if left to himself, every Tommy Atkins would have his own theory and his own sight. And this tendency has done more to vitiate results than almost any other error. Even after a definite elevation has been given by the officer, he can never feel sure that the man directing the rifle has not entirely altered it by his method of looking over the sights, and has not thus introduced a fresh variable element which should not have existed at all. Thanks, however, to the ingenuity of Major G. A. Lewes, of the Northamptonshire Regiment, we are for the future to be able to reduce the chances of such mistakes to a minimum, and there is no longer to be any ambiguity as to the nature of the sight. We shall hear no more of "full" or "fine." There is only to be one sight with the new rifle, and that is to be the correct one; and, moreover, the one which it will require something like willful carelessness not to adopt. The Government have, we are glad to say, willingly accepted the new method, and the latest patent magazine rifles are all fitted with it. In the system of which we speak the fore-sight consists of a rectangular block of metal, which, in place of being brought to a point or edge, is split down the middle. This aperture is not intended to be looked through, but the line formed by the light through it is more clearly defined, and less liable to injury than if it were formed of any white metal or enamel. The metal round the split being particularly strong, there is no danger of its shape being altered by the fixing or unfixing of bayonets, or by any rough usage. This block is sufficiently high to enable the bayonet to be fixed without the accuracy of the aim being interfered with. The back-sight, which is to be used in combination with it, is formed of a hinged flap and a sliding bar. This bar has the upper edge bevelled and a square notch cut in the middle, from the centre of which there runs vertically downwards a fine white line. The notch is constructed of such a size that, when accurate aim is taken, the block on the muzzle which forms the fore-sight exactly fills it. When this is the case, it follows that the split we have alluded to forms a continuous white line with the line at the bottom of the notch. The man who is aiming the rifle has therefore only to look over a single point, namely, the top of the line which the two sights form. He has not to bring two points in line with the object, for, when the aim is good, the fore-sight and back-sight present only the appearance of a single sight to the eye behind them. The sights are so ar-

ranged that, when the flap is lying flat and the bar is down, they are correct for 200 yards, or, in other words, that the rifle shoots point blank to that distance. With a low trajectory a man would not be safe from fire thus delivered anywhere within 300 yards of the marksman. It will be much more difficult to make an error as regards elevation with this sight than with our present one, because, if the aim is bad, the block of the fore-sight will either appear as a black mass above the general line of the bar, or there will be a gap in the edge presented to the eye. The former effect will be particularly noticeable, and therefore the tendency to fire high—which is the most common failing—will be obviated more especially. As a general rule the object to be fired at would be a wide one, such as a line or mass of men, and therefore it is very important that in volley firing the elevation, at any rate, should be correct and uniform. However great the excitement, every man should be able to see that his block fore-sight comes in line with the edge of the bar, while if he can see nothing but a black mass through the notch, he knows his direction must be approximately right. It should be easier to keep to the same elevation, and in volley firing that will be a great matter, even if each rifle be not accurately aligned on any point or individual in the opposing force. The element of uncertainty which varying light causes in all shooting should likewise be reduced to a minimum, for the amount of fore-sight seen will be always the same. The construction of the fore-sight will also protect it from injury. The slit has a large mass of metal on each side to preserve it, and there is no edge or point to be broken, or knocked, or blunted. Furthermore, in firing even at long ranges all intervening ground will be hidden from the marksman's eye, and there will be less liability of his attention being diverted from the object. It is impossible in a short article to do full justice to this admirable invention, which is as simple as it is efficient, and as accurate as it is serviceable; but we think we have said enough to show how valuable is the service which Major Lewes has done in bringing it forward, and how thoroughly it is adapted to meet the requirements of the soldier. It is not, we believe, an exaggeration to say that, fitted with these sights, our new arm will be equal to the delicately-sighted match rifle, while, as regards strength and durability, it will be far superior to that which is at present in the hands of our men.

Higher praise than this it is impossible to give. If it were not so we should willingly give it.—*United Services Gazette*.

ELSWICK ARSENAL.

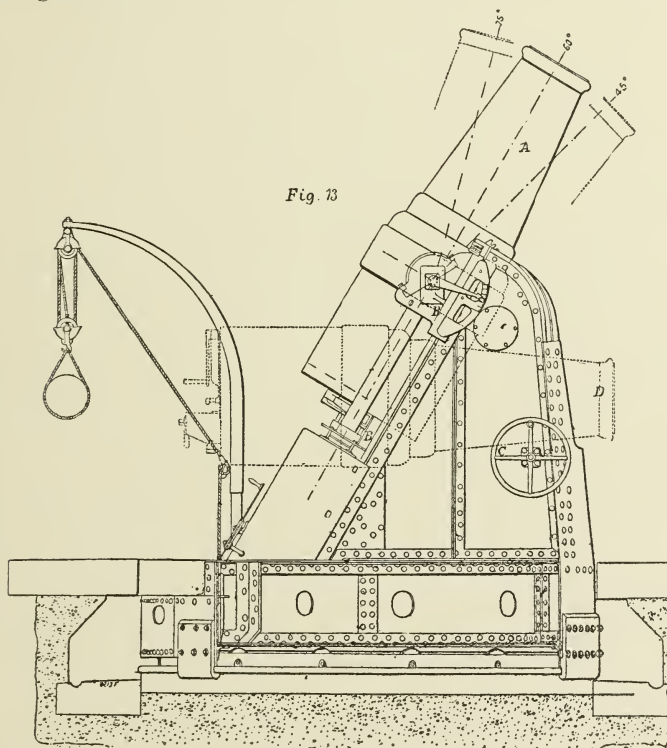
I,

ARMSTRONG RIFLED HOWITZER.

The employment of high angle fire by means of howitzers has come to the fore a good deal of late, and has been much discussed by military men. In past times, when the ordnance by which high angle fire was effected, was of a primitive description and erratic in its performance, it was considered an important means of defense against naval attack. With improvements in more direct firing heavy ordnance, high angle fire dropped into the background in the discussions of military authorities, but the high angle firing ordnance has lately been receiving its share of attention, and

this branch of warfare has, as we have said, once more come to receive more attention.

The Elswick firm have not failed to note the signs of the times, indeed they may be said largely to have created them; at any rate their rifled howitzer and mounting is the most prominent feature in this movement. We are, therefore, glad to take this opportunity of illustrating this weapon and saying a few words on the subject from information supplied to us by the makers, although we have only recently published illustrations of the Armstrong howitzer.



11-INCH HOWITZER.

Figure 13 shows respectively a side elevation and a plan of a 11-in. rifled howitzer on an Elswick hydro-pneumatic centre pivot mounting.

The howitzer in question weighs 10.6 tons and fires a projectile of 478 lbs. (217 kilos.) weight, with a charge of 44 lbs. (20 kilos.) of powder.

In the employment of heavy breech-loading howitzers of this nature, arrangements must be made by which they can be loaded in a horizontal position; loading at a high angle with the heavy shell used being inadmissible as involving too many difficulties of detail and loss of time. It is, moreover, advisable to provide for a gradual absorption of the force of recoil instead of rigidly holding the piece as in the case of the old mortar bed.

The Elswick mounting provides for these two conditions and has the further great merit of embodying the disappearing system, by which the security of both howitzer and mounting, as well as of the detachment, is considerably increased.

As shown by Fig. 13, the mounting consists of a small carriage in which the trunnions rest, moving on an inclined slide, which in turn is supported by a horizontal platform rotating on a live roller ring. The carriage is formed of two steel castings, bolted together, and is fitted with bearings for the howitzer trunnions, as well as with sockets for the upper ends of the recoil rams. The slide consists of two steel frames bolted to the upper part of the platform, the sliding surfaces on which the carriage moves up and down being placed at an angle of 60 deg. with the horizontal. To these frames the recoil cylinders are also fixed. The platform is built up of girders and transoms of steel plates and angles. It is mounted on a live roller ring, and is fitted with training gear, loading crane, and frictional elevating gear. The mounting admits of elevations between 45 deg. and 75 deg. being given to the howitzer. The hydro-pneumatic cylinders, in which the recoil is absorbed, are made of steel. Each cylinder has two chambers, one containing the recoil ram, the other the necessary supply of glycerine and air. These two chambers are connected by a recoil valve and a by-pass valve, and by means of levers the arrangement is made to serve for elevating the howitzer for firing.

On discharge of the piece the liquid in the recoil chamber is expelled by the ram through the recoil valve into the air chamber. Both chambers in the one cylinder are in independent connection by means of pipes with the corresponding chambers in the other cylinder, so as to equalize the pressures in each during recoil. To get greater certainty in the manufacture of the recoil cylinders, they are now made of solid forged steel, and the chambers are bored out. It is convenient, therefore, for the air spaces to be obtained, by having a number of chambers (six or eight) in place of one. This system gives also the advantage that a recoil press could not burst explosively, if struck. By opening the by-pass valve the liquid is forced back again by the compressed air underneath the ram in each cylinder, whereby the howitzer is again raised to the position of firing.

For loading the howitzer (which is then at the bottom of the incline) the slide is turned to a horizontal position in fifteen seconds by the elevating gear which is fitted on the left side of the mounting, and is worked with a hand-wheel on each side by one man. A spring bearing is fitted in each trunnion block to receive the smaller trunnion arms of the howitzer. These small bearings take the whole weight of the howitzer when it is being turned in elevation, the friction being thereby considerably diminished, and the easy rotation of the piece greatly increased.

The training gear is fitted on the left side of the mounting, and is worked in front by means of a hand-wheel. On turning this hand-wheel the pinion on an upright shaft is revolved by bevel gear, and engages the training rack fixed to the racer.

If the howitzer has been raised to the firing position, and it is desired to lower it into the loading position, glycerine is pumped from the recoil

ram chamber to the air chamber of the cylinder by a small lowering pump:

The weights are as follows:

	tons.	cwt.	qrs.	lbs.
Carriage	0	16	1	0
Platform with cylinders	9	6	0	7
Loading crane.....	0	2	0	14
Pivot bracket, pin, and bolts.....	1	2	2	12
Racers and bolts, with rack and bolts.....	2	14	3	12
Total.....	14	1	3	17

Great efforts have, for some time past, been made to develop the use of this fire, for which the following advantages are claimed: It attacks a war vessel at its most vulnerable point, where the armor protection is at its weakest, and the effect of one or two heavy howitzer shell penetrating the deck and exploding in the crowded battery or among the machinery and engines of the ship might be most disastrous. As regards this question, some experience was gained during the experiments which took place near Bucharest last year. On this occasion 163 shell were fired from an $8\frac{1}{4}$ in. Krupp rifled mortar at a range of 2,750 yards, with results showing a mean error in range of 36.9 yards, and a mean error in direction of 11.6 yards. The actual diagram of the practice made shows that had the mark aimed at been the deck of a ship 328 ft. long by 65 ft. broad, 102 out of 163 projectiles, or 62 per cent., would have actually struck her deck had she been engaging the battery bow on. Had she taken up a less favorable position, 37 shell, or 22 per cent., would have hit the deck. In other words, it may be gathered from these results that one out of every five shells fired, the distance being known, would have struck an ironclad at ranges up to about 3,000 yards, assuming, of course, that the vessel was stationary, or nearly so.

Although the mortar with which these experiments were made is, within the limits of its capabilities an accurately shooting weapon, its mounting is old-fashioned and defective. There can be no question that the form of carriage hitherto used with mortars and howitzers tended to increase their inaccuracy of fire. The improved Elswick mountings, by allowing the recoil to take place at a mean angle of elevation, and with the free movement of the elevating gear, permit the shot to leave the gun without its direction being disturbed by the recoil, the first portion of which takes place before the shot reaches the muzzle, and as a consequence, the accuracy of fire is greatly increased.

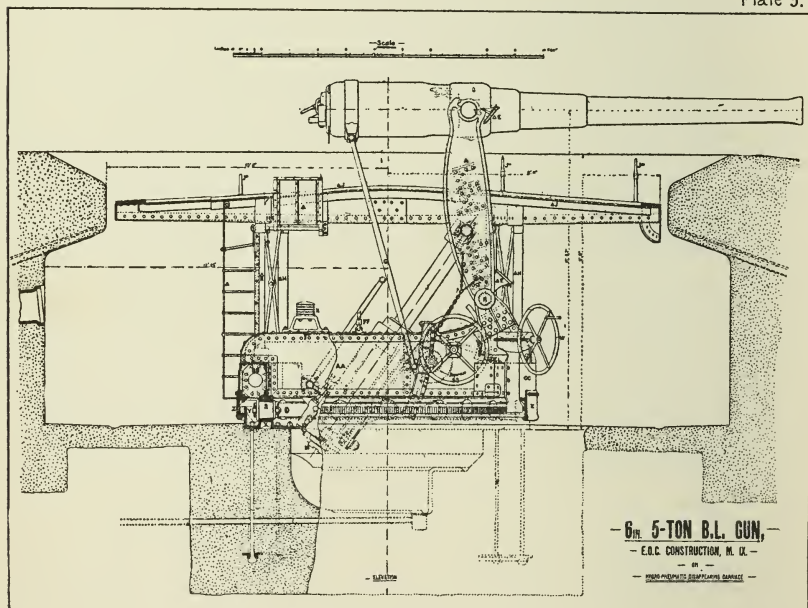
We are told that, as a fact, results have recently been obtained by Messrs. Armstrong with a 11-in. howitzer, mounted on the new Elswick carriage, which far exceed the accuracy hitherto obtained, or, indeed, deemed possible with vertical fire, and lead to the conclusion that vertical fire will henceforth enter on an entirely new phase, and be very largely made use of owing to improvements.

Three or four heavy rifled howitzers, mounted on this system, would prove very dangerous to an attacking vessel, for even one shell falling on and penetrating her decks might produce serious and, perhaps, fatal in-

juries. Against direct gun fire a ship, if an ironclad, can rely to a considerable extent on the armor which clothes her sides, but it is not possible under present conditions to furnish a ship with anything approaching to a corresponding protection against high angle fire. It is true, at the same time, that high angle fire, even from modern rifled howitzers on the improved mountings made by the Elswick firm, can never be carried on with all the accuracy of direct fire, yet as the howitzers and their mountings are relatively cheap, a large number can be employed, and thus the chance of a successful hit increased.

Where high angle fire is a feature of the defense, it is unlikely that any vessel will be able to anchor, and that in itself is no small gain. The fire from a ship continually on the move is far less dangerous than if she is able to select an advantageous position for delivering her fire, and anchor there. We shall have a few more words to say on this question of high angle fire against vessels later in these articles.

Plâte 3.



8-INCH ELSWICK DISAPPEARING CARRIAGE.

II.

THE DISAPPEARING GUN CARRIAGE.

A very notable feature at the present time in the ordnance department at Elswick is the large number of hydro-pneumatic gun carriages which are in progress. In our description of the Newcastle Exhibition of 1887, we made reference to this method of mounting guns, which occupied a prominent position in the firm's fine exhibit. The illustration, which we now reproduce, shows this form of mounting. On page 115 of our forty-fourth volume we gave a very brief account of the disappearing system, but now

we are dealing at greater length with the Elswick ordnance department, the following more extended notice of a hydro-pneumatic disappearing carriage for an 8-inch breech-loading Armstrong gun will not be out of place. It may be stated that the particular mounting in question was erected at Shoeburyness and was the subject of an extended series of experiments made by the military authorities of that station. Some results of these experiments will be given later.

The mounting consists of a lower carriage, constructed of two double plate steel beams, connected at the front and the rear by curved box transoms, also of steel. On the front of the beams pivots the upper carriage, which consists of two steel elevators, connected together by upper and lower transoms, and carrying at about their centre a cast steel crosshead, to which a ram is nuted up; a steel spring buffer is inserted in the crosshead to take up some of the strain on the head of the ram in raising the gun up to the firing position. Cast steel brackets are riveted on the lower carriage to take the transoms of the hydro-pneumatic recoil cylinder. The mounting is held down by cast steel clips, and engaged in a circular ring firmly imbedded in and bolted down through about 6 feet of concrete. The traversing gear, which consists of a train of wheels gearing into a circle rack attached to a clip ring, is manipulated by means of two wheels fitted on the ends of the front transom; its action is quick and can be worked without difficulty by two men. Elevation is given by means of long arms which are attached at the upper ends to an elevating band at the breech of the gun, and at the lower ends to elevating arcs working in graduated cast steel guides, fitted on the outside of the beams of the lower carriage. The elevating shaft is fitted with wheels and friction cone which gears into the elevating arcs, and is manipulated by means of two wheels fitted on the outsides of the beams of the carriage. The elevating shaft is also fitted with an automatic regulating brake, which is brought into action by means of a pawl, only when depressing to assist the friction cone.

The cylinder, which is made of steel, is equipped with a recoil valve and a by-pass valve: the latter is opened by a lever for running the gun up and closed again automatically by a chain which is attached to the lever and the elevator on the gun arriving at the firing position. The average time which the gun takes to rise from the loading to the firing position is 9.4 seconds. A filling cock is fitted at its lower extremity, and half way up with an escape cock to charge the cylinder; the latter is opened and liquid (glycerine and water) pumped in till it commences to run out of the escape; this is then closed, and air pumped in till a pressure of 1,650 lb. per square inch is obtained.

A great feature in this mounting is a small gun-metal lowering pump worked by a long arm, which is detached when the pump is not required. This pump is generally in action, and when used transfers the liquid underneath the ram round the recoil valve into the outer chamber of the cylinder, thus allowing the gun to descend by its own weight. The gun can thus be pumped down easily by four men in fifteen minutes. (It has been actually pumped down in five minutes by using two relays.) This saves a great amount of time and labor at drill, or when testing the working of the mount-

ing. Also when firing with the reduced charge (75 lbs. powder) which does not give sufficient recoil to admit of loading, the pump has to be used between each round, taking fifty seconds to bring the gun down.

REMARKS ON HYDRO-PNEUMATIC CARRIAGE.

Pumping down was done in 7 minutes whole stroke of ram. One man could work the pump; two could work the gun right down. The live roller and ring and rollers were examined after firing, and were found not to be indented in the least. The clips were examined after firing, and showed no signs of straining. Plain water was used in the cylinder for this trial, and no appreciable leakage was noticed. The new arrangement of valve working and cut-off gear acted in a satisfactory manner. Trials at Shoeburyness, charge 100 lbs. B. P. powder, shot 180 lbs.

The mounting is protected in a circular pit 24 ft. in diameter, surrounded by a parapet 10 ft. high.

The emplacement is covered by a circular shield 1 in. thick, supported by four steel pillars which rest in sockets on the lower carriage. The shield is cut out in the centre to allow the gun to pass through. Access is obtained to the top of the shield by means of three ladders, one forward leading to a man-hole for looking-out purposes and laying the line of gun roughly on the object before it is raised, for which purpose two rough sights are fixed on the top of the shield, the other two ladders are fixed to the opening in the shield on each side just in the rear of the breech of the gun when in firing position; at the top of these are hinged small platforms for use in laying, which are brought into a vertical position, and out of the way of the recoiling gun, by a spring after the weight is taken off.

Exclusive of the man required for bringing up the ammunition, five men can work the mounting, viz., two to traverse, two to work the breech and attend to the elevating gear, and one to attend to the vent.

In our own country, and in the colonies, the disappearing system has been adopted to some extent; 10-in. guns having been so mounted at Harwich, Sheerness, and elsewhere. The Italians, however, who seem to have paid hardly less attention to matters of coast defense by land than they have to their navy, have carried the principle still further, and have applied the system to guns of 70 tons weight, and the Elswick firm have been entrusted with the execution of the orders. For the defense of the chief Italian arsenal at Spezia, cupolas designed by Gruson and containing 120-ton Krupp guns have been adopted. The expense of these structures and their armament must, however, be excessive, and although the vital importance of the position may warrant almost any outlay, as an exceptional instance, yet cost must necessarily be the governing factor in questions of land defense, as it is in naval policy.

Whether as efficient a protection could be obtained by a less sum spent in hydro-pneumatic mountings on the disappearing principle is a question far too wide and too delicate for us here to discuss, but the claim of the advocates of the latter system will hardly be disputed "that the economy in material, time and cost, by applying the disappearing system to guns of the heaviest nature, is very great."

We have at Malta and Gibraltar 100-ton guns mounted on the Armstrong protected barbette system; an arrangement which appears well adapted for the requirements of the locality. In armored turrets at Dover, containing

80-ton guns, we have another example of an adaptation of a principle fitted to the special features of the case. It has been said that the question of the defense of any point resolves simply to this: "How to provide a first-class artillery fire sufficient to guarantee the security of the position, combined with adequate, if not complete, protection." It is claimed that when the expense attending the installation of very heavy armored forts is exceedingly great ("millions of money") a middle course, entailing less expense, may be found in the disappearing system; whereby the same power of defensive fire may be associated with what is practically a sufficient protection. The protection afforded against hostile fire is not, it is claimed, less effective than in the case of turrets, and under certain conditions it may even prove superior. On this question there may be room for discussion, but the next claim put forward for the disappearing system will hardly be disputed. When the site is favorable a practically complete invisibility of the gun emplacement can be obtained so long as the gun is not elevated. An armored fort necessarily presents a constantly visible mark, against which fire can at all times be directed, whether its guns are replying or not. The value of a masked battery for coast defense has always been recognized, but the difficulty of old was how to disguise the position so as to conceal its warlike character from the practised eye of the seamen, and once the deception had been exposed, there was always the fort or battery existing above ground to afford a mark upon which enemy could direct his fire. The interval between the discharge of very large guns must be great, and invisibility then becomes of additional advantage, a fact which was very prominently brought out by trials of the disappearing system made at Portland.

When the gun can be placed at some altitude the position is doubly advantageous, for not only is a greater command of fire secured but the gun is naturally less likely to suffer from the attack of the enemy. Sites for positions of this kind are usually not difficult to find, and enable the distinguishing characteristics of the disappearing system to be combined to the fullest extent.

The Italian Government have associated the disappearing carriage with the 11-in. rifled Armstrong howitzer, and the success obtained by this combination has no doubt largely influenced our own military authorities in adopting the mounting. A good many trials have been made in Italy with the howitzer and disappearing carriage. On the next page we give a diagram which shows the result of practice as obtained at the Elswick range by a few experimental rounds at different unknown distances. In this diagram the outline of a first-class battle-ship is shown in two positions, the area represented by its deck inclosing the spot aimed at in the practice. It will be seen how destructive the fire would be against a vessel at anchor and how much the difficulties of bombardment from sea would be increased by a few emplacements such as this. Far more elaborate experiments have been made at Spezia and elsewhere in Italy, but of the details we have no knowledge, although it is well known that the Italian authorities have every reason to be satisfied with the results; a very practical illustration of which is the large number of the heavy howitzers with Elswick carriages that they have provided for coast defense. In all these matters the Italians

show the greatest enterprise and activity, and the shores of the Italian peninsula promise to be the best protected of any power.

The application of the disappearing system to heavy guns has been the result of experience obtained at Elswick with lighter natures. It would, indeed, have been a bold man who would have ventured to predict that the monster ordnance of the present day would be placed on such carriages. The experience with the smaller guns at first tried was, however, always encouraging, and indeed, up to the present, there has been no break in the successful career of the system, as it has been extended to weapons of more weight and importance. In the design the same general features have been retained as those of the smaller calibres; although, of course, in detail, important modifications have been made as weight of gun increased.

The aim has been to supply a system of mounting in which a heavy gun can be worked without employing power or an excessive number of men. It was found by the installation of the Spezia defenses, that the power required to work heavy guns in turrets led to complication of mechanism, and a very great outlay of money. The value of being able to work by hand a weapon of such power as the 70-ton gun, at reasonable speed, was thus clearly demonstrated.

The work done in manipulating a gun is divided into the operations of training, elevating, opening and closing the breech, loading and supplying ammunition. By placing the whole mounting on a ring of live rollers, great ease of training is attained. Although the weights to be revolved in some cases approach 170 tons, four men are found sufficient to train the whole through half a circle in about a minute and a half.

With regard to elevating, when the gun is down the gear can be set to any desired degree of inclination of bore without moving the gun. When the weapon rises it assumes the assigned elevation upon arriving at the firing position. For opening and closing the breech, the hand gear used is capable of applying great power, should greater force be necessary, or it can be quickly changed to afford rapidity of movement in those operations in which speed is of greater importance.

One round at five degrees depression was fired over the water. To find the path of the gun-muzzle a trough of clay was set up. The indication thus given showed that the arcs are gradually pulled up against the stops, on guides, arriving there after the muzzle had gone back five feet three inches, or just as it passed the edge of the shield.

The charge was about 100 lbs., shot 180 lbs., recoil 18 inches from the buffers, and the movement of the arcs just as described above; after that they ran to the bottom. On a subsequent occasion further rounds were fired.

The pressure found remaining from round No. 5 was 1,580 lbs. per square inch.—*Engineering, London.*

"MILITARY PROGRESS, 1888."

In Colonel Von Löbell's annual report upon the changes and progress in military matters during 1888, we note the following :*

INFANTRY TACTICS.

In Germany the series of new regulations, having for their object to bring the instruction of the Army up to the level of the latest developments in arms and in the tactics resulting from the introduction of them, was crowned by the publication on the 1st September, 1888, of the new infantry drill-book.

Comparisons between the new regulations and those they replaced have been published in many forms, as also in many languages. They show that the emendations and changes in the old regulations are very numerous, but beyond getting at this result the comparison is not of any great value. It will be sufficient to note here that the foundations on which the new regulations are based are : 1st, that the individual instruction of the recruits shall be as thorough and complete as it is practicable to make it ; and, 2dly, that what is taught throughout shall be applicable to the battle-field. The enormous amount of experience gained during the War of 1870-71, the collation of which has become possible through the publication of numerous regimental histories, and the works of many able writers who took part in the campaign, has allowed of decisions being arrived at as to what formations and movements are absolutely impracticable under effective fire. All such have been either altogether omitted or reserved for use exclusively on formal parades, and the number so reserved has been reduced to a minimum. A reference to the summary already referred to in the note will show how completely this rule has been adhered to. The reasons for it are not far to seek. In the first place, with the shortened service, time is no longer available in which to teach men formations and movements which it is impracticable to use before the enemy without heavy losses being entailed. And, in the next place, experience shows that what soldiers have been taught in Peace, they will, in the excitement of the battle-field, naturally do ; it is, therefore, of double importance to restrict the instruction to such points as will be required in War. One other very noticeable point is the absence from the new regulations of any normal formation for attack, and the absolute prohibition against any such being drawn up or practised.

In France, also, new regulations were issued for trial by the infantry, in May, 1888, but were found to be so impracticable that they were withdrawn. The spirit in which they were drawn up is evidenced by the fact that the five parts into which they were divided contained 766 pages, whereas the German Regulations contain 172.

The issue of new musketry regulations gave more satisfactory results. The number of rounds of ball ammunition to be fired yearly is, for the active army, 120 ; for reservists, 27 ; and for men of the territorial army, 20. The exercises are divided into individual firing, at which 88 rounds are fired at ranges up to 600 metres. The remainder, 32 rounds, are fired in six practices, in volleys, at 600, 800, and 1,000 metres, one practice being devoted to

* R. U. S. I. Journal No. 150, by Colonel H. Hildyard.

magazine volley firing (8 volleys in the minute); one practice at independent fire advancing from one position to another, from 600 to 500 metres; and one practice with rapid fire with the sight at 400 metres. In addition to this, 50 rounds are allotted to field firing, and are distributed as follows: two practices at unknown distances, under a non-commissioned officer; one practice in volley firing, under the commander of the sub-division; one practice as a company advancing to the attack from 800 to 200 metres; and one practice as a battalion advancing to the attack in the same way.

The 8th chapter, which deals with the rules for the control of fire, is the most important, and is based on the performances of the new Lebel magazine rifle. Fire control is carried out by units, which should not be larger than a half-company. The commanders of these regulate the beginning, the end, the interruption, and intensity of the fire, the object of which is to produce the greatest possible effect in the shortest possible time. Fire at long ranges seldom repays the expenditure of ammunition; when it is employed, a large number of rifles should be directed on the same object. The employment of fire is ruled by the consideration whether the engagement is of the nature of an attack, of a defensive action, or a rapid assault. In the attack, fire should be opened as late as possible, but then continued with the greatest possible energy and rapidity. As regards the application of the different kinds of fire, the battalion commander points out the object to be fired on, and, as far as possible, the portion of the enemy's line on which the fire is to be concentrated. The captains regulate the application of the fire and the expenditure of ammunition, and point out the object if this has not been done by the battalion commander. Half-company commanders and non-commissioned officers superintend the proper arrangement of the sights and the direction of the fire. Volleys are only to be fired by units not larger at the most than a half-company; rapid fire is only to be employed at decisive moments, and magazine fire only on the command of the officers. The distances are divided into: short (up to 600 metres); medium (600 to 1,200 metres); long (over 1,200 metres). Individual fire is only to be employed up to 300 metres against skirmishers covered or lying down, to 450 metres against single horsemen, 600 metres against groups of four or more men. Concentrated fire is recommended against objects of the breadth of a group up to extended columns and lines from 800 to 2,000 metres, being dependent in a great degree upon conditions of weather. Officers and non-commissioned officers are at the medium and long distances to observe the effect of the fire, and regulate the sights accordingly; in exceptional cases, where opinions regarding the distance differ as much as 200 metres, the sights may be set at several distances. As regards the vulnerability of the several formations, it is stated that the company in line begins to feel the effect of fire at 1,800 metres; the half-company columns and company columns at 2,000 metres; men kneeling are almost as easy to hit as standing up.

The Italian infantry also received in 1888 new musketry regulations, as a result of the introduction of the magazine rifle. As in the cases of France and of Austria during the past year, this issue of the new arm has entailed a material increase in the quantity of ball ammunition allowed for practice.

CAVALRY TACTICS.

No material changes took place during 1888 in the views already generally accepted in regard to the inanner of employing cavalry in war. In the matter of equipment, the days of the cuirass are at an end except as a parade dress; and its use has been discontinued by the German cavalry. The lance, which had fallen into disrepute, and been entirely set aside by some European armies, is coming into favor again, and it seems likely to be established in the high place it formerly held. The question of giving the cavalry a repeating carbine has been freely discussed; but in France alone it was decided to arm the cavalry regiments with one, namely, with the Lebel repeating carbine (8 mm.).

In Germany increased importance was given to the use of the carbine by the publication of new musketry regulations for the cavalry. In these it is pointed out that instruction in firing is one of the most important portions of the training of cavalry, and must be carried out in all its parts with the greatest care. Whereas, formerly, special prominence was given to the training of the cavalry soldier at short distances, it is now prescribed that he is to be equally carefully trained throughout the three classes, for it is at longer distances that fire will ordinarily be possible. In field firing the manner of delivering the fire is restricted to groups and subdivisions; individual firing finds no place. Firing by groups is employed principally at short distances up to 500 metres; by subdivisions at medium and long distances.

The practical value of a more thorough training of cavalry in the use of the carbine was evidenced by an advanced guard exercise carried out over the Hagenau practice ground. A squadron formed part of the body of mixed troops employed, and was utilized dismounted, from time to time, to direct carbine fire against targets representing an enemy. The results were not altogether satisfactory, and gave occasion for the general commanding to point out that, though the employment of cavalry with their carbines dismounted would seldom occur, adequate training is indispensable if they are to avoid a check in such cases. The difficulties for the subdivision commanders in judging distances correctly in unknown and unexpected conditions, in quietly conducting the fire and maintaining fire discipline, are clear; constant practice is, therefore, required.

In Russia, judging from the dispositions made for the manœuvres, the theory regarding the employment of masses of cavalry, as mounted infantry, appears to have continued to lose ground. Great stress was laid upon the importance of cavalry being employed in concert with, or in opposition to, infantry in every manœuvre in which infantry took part. Night manœuvres were practised, and it is thought in Russia that in future wars they will play an important part.

In France the tactical training of the cavalry is seriously interfered with by the number of recruits, due to the short periods of service (generally $3\frac{1}{2}$ to 4 years), and by a number of the remounts being unfit for the field. Including volunteers, each regiment has from 260 to 290 recruits each year; and, judging from the manœuvres, when the divisions were about 1,900 horses short, the regiments are still worse off in the matter of horses. In

these days, when training under service conditions is acknowledged to be of so much importance, French cavalry is placed by these circumstances in a very disadvantageous position as compared with the German.

FIELD ARTILLERY TACTICS.

The issue provisionally of new drill regulations for the Prussian Field Artillery in the spring of 1888 will no doubt be followed by the adoption generally of new regulations, the necessity for which has arisen through the changed conditions under which the arm is now employed in the field.

The principal tactical question under discussion has been the bearing on the employment and importance of field artillery fire, of the introduction of magazine arms. In an article in the German military review, "*Mittheilungen über Gegenstände des Artillerie-und Geniewesens*," this question is discussed by Captain Freiherr v. Stipsicz. He arrives at the conclusion that, seeing that it was already impracticable to attack a position held by infantry with ordinary single loaders without previous thorough preparation by artillery fire, the necessity for this will be enhanced in the case of the defenders being armed with repeaters. To insure this thorough preparation, he urges:

1st. The most extensive employment possible of the fire of artillery masses.

2d. That sufficient time be allowed in which to bombard the place at which the assault is to be made.

3d. The direction upon this and also on the reserves of a powerful fire.

4th. Immediate accompaniment of the attack, especially by those batteries that are masked by the infantry, up to 675 or 750 metres.

These principles for the employment of artillery must exercise an influence on the organization of the field artillery, for they will necessitate a strong corps artillery. The deductions drawn by the writer for the training of field artillery in Peace are three:

1st. The most important is its instruction in every phase of fire action; more attention must be paid to firing at long, even very long, ranges.

2d. The training in firing by masses must be attended to much more than hitherto.

3d. The great mobility and power of manœuvring of the artillery will form one of the most important factors in firing by masses.

With the exception of the increased importance given by the writer to practice at very long ranges, his views are no doubt practical and just. The necessity for a good and strong artillery to silence the fire of the enemy's guns, and to search out that portion to be attacked, and so increase the chances of success from the infantry attack, is still greater than it was before. He who remains the victor in the artillery engagement is apparently the victor in the battle.

The question of rapid communication in War continues to attract attention, and during the past year some interesting observations were made on the subject in France. From these it appears that 1 kilometre can be covered by a pigeon in 1 minute, by a hound in 2 minutes, by a bicycle or a mounted

man at a gallop in 3 minutes, and by the latter at a trot in 4 minutes. The establishment of the pigeon post on an extensive scale in Russia has already been referred to. In connection with the operations about Massowa, the Italians have made practical use of the pigeon post with excellent results. Communication is not only regularly maintained between the outlying posts and the chief station at Massowa, but reconnoitring patrols take with them pigeons in baskets, to enable them to communicate intelligence rapidly back to the station from which they were sent out. If a pigeon arrives back without having a message attached, and with some of its tail feathers pulled out, it is an intimation that the patrol has been surprised.

It appears, also, that in Italy a way has been found of maintaining balloons in the field, or before an invested fortress, for purposes of observation, without the encumbrance of a bulky train. Small balloons, suitable for one observer, have been constructed for the expeditionary corps in Africa, the necessary gas for their inflation being contained in an easily transported small, steel cylinder. The entire transport per balloon consists of three vehicles.

The same difficulty, namely, the necessity for a bulky train, is encountered in the application of the electric light for the purposes of fortress warfare. Experiments made in Austria showed that with three wagons a powerful light can be obtained and maintained, capable of being rapidly moved. Both in Germany and in Spain experiments were made in night operations, both the ground and the object being lighted up by the electric light. In the case of the Spanish trials, it was found that in individual firing under peace conditions the hits were as 74 by day to 33 by night; but in field firing under service conditions the results were about equal. The German experiments showed that those men within the sphere of light made better practice than those without it.

Great attention has been, and continues to be, paid to the employment of quick-firing guns in fortress warfare. In Germany, experiments conducted at Krupp's factory with these guns, varying in calibre from 4 to 13 cm., of which the two heaviest, namely, the 10.5 and 13-cm. guns, appeared the most suitable for fortress warfare. The time occupied in firing one round was four and five seconds respectively. Italy has adopted the 12 cm. Armstrong Q.F. gun for use in her navy, and also the 25 mm. Maxim machine gun.

In Part II. of the Report on Fortress Tactics, the question of the value of permanent fortresses and forts is discussed with reference to the theory advanced during the autumn of 1888, to the effect that, looking to the progress made by artillery, especially in the use of projectiles charged with high explosives, permanent works have lost their defensive value. The alternative suggested was the construction, as tactical considerations might dictate, of provisional earthworks, to be furnished with armored towers and shelters, made with the special view to their transport from place to place. In the report the fact is accepted that, in the field, attack and defense will be more and more a matter of position warfare, and so become more or less assimilated to fortress warfare. But the argument from this, that permanent fortresses and forts can be dispensed with, is combated. The inferences drawn from the experiences of the 1870-71 war are not to be depended upon,

for it is only since that war that the study of, and instruction in, fortress warfare have been seriously taken up. Had the French fortresses been defended with the knowledge and skill that have since been gained, the results might have been different. The existence of permanent fortifications does not prevent the construction, when tactical considerations require it, of strong provisional positions, as was done at Düppel, Plevna, Sebastopol, and frequently in the American War. The writer of the report, therefore, lays it down as his opinion :

1st. That a rational system of land defense will always be connected with such defenses as are already in existence, and will not experiment with extensive changes in the fortifications.

2d. That, looking to the value attributed to fortresses in all ages, it is not justifiable to introduce a new era of provisional fortifications, notwithstanding some examples in War which seem to favor these.

Comment and Criticism.

I.

"Fortifications and Fleets."*

Admiral David D. Porter, U. S. Navy.

I SEND you herewith a copy of a report I made to the Secretary of the Navy in July, 1887. I think this report is an answer to nearly all the points raised by Admiral Colomb.

The Admiral, like all British seamen, believes in the invincibility of the British fleet, and is willing to leave the defense of the country to that great armada which has up to the present time bid defiance to all the nations of the earth and will continue to do so while the descendants of the Norsemen retain that indomitable skill and courage, which has made them the foremost seamen of the world.

But, notwithstanding Admiral Colomb's idea, that the British fleet could be made sufficient to protect the coasts of Great Britain, you will notice by my report that the British people are spending millions upon millions in the construction of land defenses to prevent an enemy's fleet from entering their ports.

Forts are very much more valuable now than they were in former times. Up to 1875, the rule held good that almost any fort could be silenced by ships, provided the latter could approach near enough and were in sufficient numbers.

The whole system of warfare has now changed—there is at present no limit to the size of a rifled gun and no limit to the thickness of iron which can be put upon a Timbety turret, and the gun remains king over all the other implements of warfare.

There is no limit to the endurance of a properly constructed fort, while there is a limit to the endurance of an armor-clad and a limit to the size of the guns these formidable vessels can carry.

Our policy then should be to build the heaviest fortifications at every point likely to be assailed by an enemy, and I am satisfied that if the heaviest guns were placed in these forts no armor-clad would attempt to attack them, for if they did, they would meet with destruction.

In former times, ships carrying a hundred guns, would attack the old forts and in many cases the forts would have to succumb. No men could stand to their guns under a furious bombardment where grape, shrapnel and bursting shells swept everything before them. Witness the Battle of Copenhagen when Nelson with a part of the British fleet silenced the powerful land batteries; the French at St. Jean d'Acre; the English at Algiers and other places which might be mentioned, and finally the attack on Fort Fisher, one of the most formidable works ever constructed, which was silenced in an hour after the ships began the bombardment. All this was owing to the fact that the ships were able to *mob* the forts and keep the men from their guns.

Such a state of affairs cannot obtain under the system of fortifications proposed at

* *Fortifications and Fleets*, by Major Walker, R. E. Reprinted in JOURNAL, NOV., 1889.

the present day, where the heaviest guns on shore will be covered in by the Timbey system of turrets, or protected by earthworks plated with iron.

If you will observe, I exhibit in my report the same weakness for iron-clads as is shown by Admiral Colomb in his remarks about building up a great British fleet. This was because I wanted to use every argument to impress upon our people the importance of building a strong armor-clad navy, but I have given up all hopes in that direction and now rest my hopes on heavy fortifications armed with the largest class of guns.

There are at present five nations of Europe against whom we could not contend with any prospect of success, Great Britain, France, Germany, Russia and Italy. All these have powerful fleets and could enter our most important ports whenever they chose to do so.

The incapacity we have exhibited since we commenced to build an armor-clad navy in 1882, and the slow progress we have made, satisfies me we have learned nothing from the example of European nations. We have nothing that could protect our coasts from a foreign iron-clad and therefore, the sooner we go to work and construct coast defenses the sooner our safety and our honor will be assured.

You will notice that in my report I call our Navy the right arm of the national defense. I was then dreaming that we might some day have a navy approaching in power those of the nations of Europe, but that illusion has vanished and I see little prospect for our Navy until perhaps the coming century, when a hundred and fifty millions of people may demand that we have a navy not only to help defend our coasts, but to carry devastation abroad.

There is one strong point in favor of heavy forts. They will afford points of refuge for our iron-clads in case they are driven from the sea by a superior force. The combined forces of Army and Navy would prevent the enemy from following them up.

It is very foolish for men to argue solely in favor of their own branch of the Service, they should take into consideration what is wanted for the whole defense of the country. I therefore take the most liberal view and advocate defending all our harbors with the heaviest forts.

Foreign nations are all doing this to the greatest extent—all see the necessity of it, having been taught by experience—while we, resting under the delusion that no foreign foe will ever trouble us,—that our policy is one of peace—leave our coasts undefended against the most ordinary antagonist.

WASHINGTON, D. C., November 5th, 1889.

Lieut.-Colonel William R. King, Corps of Engineers, U. S. A.

The very able and interesting paper on "Fortifications and Fleets," by Major Walker, R. E., reprinted in the last number of your JOURNAL from the *Journal of the Royal United Service Institution*, is of especial interest to our Service at this time, and we may draw some valuable lessons from its study.

It is evident from this paper and from the papers and animated discussions preceding it, that our cousins—the sister services on the other side—have been entwining their fingers in each other's hair in a most unsisterly fashion, and, while we must avoid mixing in "family quarrels," we may from this safe distance inquire what it is all about and what bearing, if any, the discussion has upon our own services. This is how it began: While Parliament was discussing a loan of about \$15,000,000 for forts, a proposition was made to cut down the naval estimates about \$4,500,000. This was more than Admiral Colomb, R. N., could patiently endure, and he was constrained to "up anchor" and "sail in," which he did in a most vigorous style, with "two sheets in the wind," as it were, or perhaps more strictly speaking, the wind was in two sheets,

viz., the *London Times* and the *Journal of the R. U. S. Institution*. But, laying the figure aside, it must be admitted that the gallant admiral made a most powerful presentation of the navy side of the question, taking, however, for a text not the budget aforesaid, but an article on quick-firing guns, by Captain Stone, R. A., in which that officer had ventured too near the salt water.

This paper of Admiral Colomb was followed by exhaustive and thoroughly English discussion in the R. U. S. I. on two occasions, by some of the ablest representatives of the Army and Navy, as well as by distinguished civilians.

It is not proposed in this place to repeat much of these discussions, as most of those who are sufficiently interested in the subject to read this article have probably read the original discussions, and those who have not read them had better do so than to depend upon any abstract which could be given in this brief space.

Reduced to its simplest form, the contention of Admiral Colomb is that the Navy must be increased so as to take and hold the mastery of the sea against all comers, and, until this is done, no money whatever should be expended on fortifications. On the other hand, it is held that dock-yards, depots and coaling stations must be strongly fortified, and that it should be done at once, by strengthening the defenses already built and by adding others where they are most needed. It is interesting to note that all parties are agreed that some kind of defense, beyond what they now have, is necessary for the safety of the Empire; that the Navy is of first importance; that it is at present in a most unsatisfactory condition, and that forts are desirable in certain places, even in England, with all her naval power. Admiral Colomb, himself, was compelled to admit that, in his later arguments, but he stoutly maintained that the Navy needs no fortified base either for supplies, or as a place of refuge, in case of possible disaster, and he holds that if the Navy should lose control of the sea, England would immediately be starved into submission, as she obtains most of her provisions and raw materials from abroad. This, it must be admitted, is a strong argument, in fact, it is unquestionably his *strongest* argument, but we must note two exceptions, as the lawyers say, in passing.

First. The danger of starvation is not so great as would at first appear. The experience of blockade-running during our late War suggests that we have plenty of merchants and skippers who would like no better contract than to supply John Bull with his "roast beef," *for a reasonable compensation*, notwithstanding that his ports were blockaded, and even if our own country should be the unfortunate victim of his hostilities, I suspect there are some of the driving ones who would "turn an honest penny," in that way. Their consciences would not allow *so rich* an enemy to suffer.

Secondly. As to the bearing of the starvation argument on our own affairs, it need hardly be stated that we are in no danger of a famine, even if all the navies of the world should attempt to blockade our ports. An effective blockade of five or six thousand miles of sea-coast would be a task that no single nation is likely to undertake.

Major Walker points out the visionary nature of Admiral Colomb's proposition to make the Royal Navy supreme in all parts of the earth, and shows beyond question the necessity for permanent works to defend harbors, dock-yards and coaling stations. Without attempting to follow out his line of argument, we may note that in 1810, England had 664 armed cruisers at sea, but in 1887 she had only 106 in commission and 23 more ready for sea; but, according to Admiral Hornby, there were only 37 effectives out of the whole lot. This shows what a vast amount of work is required to bring the Royal Navy up to Admiral Colomb's standard, and how vastly *more* difficult it would be to bring *our* Navy up to such a standard that it could contest the supremacy of the sea with the English Navy. Of course, there can be but *one* "Mistress of the Seas," and according to Admiral Colomb, in fact, according to com-

mon sense, a navy must be at least equal to its antagonist in order to be able to defend itself, to say nothing of defending the sea-coast of a continent.

But this is not all. We do not admit that even a navy that is "Mistress of the Seas" can be safely trusted to defend the vast interests exposed to capture along our sea-board. Divide such a navy, however large, among our twenty odd important sea-ports and the enemy could take them in detail. Admiral Colomb's idea that a fleet can protect a harbor 700 miles distant is the most transparent moonshine. It is a singular fact that the same number of the *Journal R. U. S. I.*, which contains this remarkable proposition, and supports it with the statement that the French fleet under Admiral Bouët dared not attack Colberg because there was a German fleet 700 miles away, contains also a French report of the campaign of 1870 in the North Sea and Baltic, translated by Admiral Colomb himself, showing conclusively that the German fleet had nothing whatever to do with Admiral Bouët's decision not to bombard Colberg and other German cities.

But there are many other reasons why fleets cannot be trusted to defend cities, dock-yards, etc., among which may be mentioned the enormous cost of mounting guns on ship-board as compared with the mounting of doubly efficient, and more than doubly protected, guns on shore, a very plain illustration of which is the fact that a cruiser only partially covered with armor and carrying only say 10 guns of moderate calibre costs \$2,500,000, or \$250,000 per gun, while the same expenditure will easily mount 100 guns and mortars in secure batteries on shore.

Without going into the details I am prepared to show by actual estimate that this is a very safe comparison. It is well to bear in mind that the forts at Spithead, Plymouth and Dover are not by any means as antiquated as some people appear to imagine. Major Walker states, as other engineers have stated heretofore, that these works can easily be brought up to date by increasing the thickness of the armor plating, and that provisions were in many cases made for this in the original construction.

As an illustration of how much more durable forts are than ships, and how much easier they are to modernize, I may state that the masonry fort at Willet's Point, which was partially built twenty-five years ago, and which has been left in an unfinished state ever since, could be protected with steel and concrete so as to make it as secure against the most formidable projectiles of the present day as it was when designed against the projectiles then in use, and that this would not cost more than 65 or 70 per cent. of the amount already expended on the work, or say \$17,000 per gun, as the fort will mount about forty 10-in. rifles.

Where is the ship of twenty-five years ago that could be brought up to date by any such expenditure?

With one more illustration of Admiral Colomb's absurdity I will close this already extended paper. The great advantage claimed for a fleet in coast defense on account of its mobility is an argument in exactly the opposite direction. What would have become of Samoa if its defense had depended on our fleet, which was almost annihilated in a single storm? And of what value was the fleet in Hampton Roads in coast defense when the *Merrimac*, single handed, practically destroyed it in a few hours? Plenty of instances of the fleet's being in the wrong place when urgently wanted could be given, but I will only mention one case which came under my own observation and which is of sufficient importance to be noticed on its own account. I refer to the time when General Grant's base of supplies at City Point and the supplies for the Army of the James at Jones' Landing depending upon the James River fleet for their protection against an attack by water were saved from destruction by the narrowest chance.

Most of the fleet had gone on the Fort Fisher expedition, leaving one double tur-

retted monitor and a torpedo boat to watch the Confederate ironclads lying in the river above Dutch Gap. Taking advantage of the situation these ironclads, the *Richmond*, *Jamestown*, *et als.*, came down one night and came very near clearing out the entire river. The only thing that prevented, so far as I have ever been able to learn, being the fact that one of the smaller vessels was sunk by a mortar shell, from a shore battery, and another ran aground in trying to pass the obstructions in Trent Reach. The expedition was then abandoned and before it was renewed additional vessels were telegraphed for by General Grant and shore batteries were built mounting heavier guns, to guard against a repetition of the attack. That the danger was imminent no one could doubt; orders were given to sink any or all of the supply vessels and barges lying at Jones' Landing in the draw of a pile-bridge we were then building, and bales of hay were turned into hasty shelter for riflemen who, it was hoped, might pick off the crew of the ironclads through the conning holes in the armor. At General Grant's headquarters, at City Point, where the entire reserve of ordnance and commissary stores were stored, a couple of siege guns were hastily put in position on the bluff, from which it was hoped a lucky shot might damage the ironclads should they come down and undertake to sink the fleet of transports moored at the wharfs and anchored in the river.

Thus we see that the *mobility* of a navy may enable it to be at the *wrong* place when most needed; and in like manner the power of *floating* involves the possibility of *sinking*, either from storms, rocks, or torpedoes, or still worse from collisions with each other, which, even in cases of friendly evolutions of the Royal Navy, have caused serious damage to quite a number of ships. Forts may rejoice that they *do not float*.

WILLET'S POINT, N. Y. H., Nov. 30, 1889.

Capt. W. J. Sampson, U. S. Navy.

The relative efficiency of forts and ships for the defense of a coast depends upon the kind of defense which is contemplated.

If it is desired to protect a locality from capture or destruction by a naval force, this can best be done by fortifications, provided they can be properly placed. If they can be placed so far in advance of the locality to be defended as to render it impossible that the guns of a fleet shall reach the locality in question without coming within destructive range of the guns of the forts, then the forts will furnish complete protection. And in the future the great support which forts will receive from submarine mines will make a given defense by forts more efficient than it has ever been before. If a locality is properly defended by both guns and submarine mines, I think it will be in rare cases only that a fleet will attempt to force a passage. If, however, the forts cannot be given such an advanced position, or if they cannot be assisted by submarine mines, then, in such cases, I think, forts will not furnish the requisite protection. Doubtless there are instances where a fleet which has passed the outer fortifications may still be kept under fire; but the projectiles then intended for the enemy may reach friends instead. The great increase in the power of guns has given an enormous advantage to the ship; not in overcoming the fort, but in overreaching it. A city or a dock-yard furnishes a large target—*fixed in position*. It can, though unseen, be aimed at from the sea on a dark night, or during a dense fog. The guns can be aimed from compass bearing, and at such long ranges. This will probably be done in all conditions of weather. While though the guns on shore may be more accurately pointed, and the distance be known with all the precision furnished by modern appliances, yet the ship will always remain a small target, and even that will be frequently obscured. If, however, such a defense of the coast is desired as will render it impossible for an enemy to molest it, forts alone are not sufficient even under the most favorable circumstances. Forts are efficient only at

the points they are constructed to protect, and their moral influence extends scarcely beyond the range of their guns. They cannot prevent blockade, and just here is the vital point. The disastrous consequences of a blockade to a commercial nation would be far greater than those of a bombardment.

It was doubtless the intention of the Council of the Military Service Institution in reprinting the paper of Major Walker, R. E., to draw some lessons, useful to our own country, from the arguments and suggestions contained in the paper. Our isolated position as regards other powerful nations is a source of security which Major Walker declares does not belong to the insular position of Great Britain. The controversy which has been in progress for some time in that country, as to the importance of ships and forts for defense of the kingdom, cannot be supposed to settle the question for us even were it decided for her. The conditions are totally different. England has colonies scattered all over the world, and only a navy can protect them. She is separated from several possible enemies by a narrow strip of water, which she must patrol with her mighty fleet to prevent those enemies from crossing. Although the demands upon the services of that fleet come from all parts of the world, it may readily be seen that its existence renders forts less necessary than they would be without the fleet. We have no colonies, our neighbors are 3,000 miles away, except those who have colonies, or coaling stations near our coast, which practically brings them to the same distance, so far as naval operations are concerned.

It is hardly necessary to mention to members of the Military Service Institution that this country, in case of a foreign war, would probably have to defend herself only against a naval attack; and unless we are able to destroy any bases of supply near our coast which our enemy may possess, we shall certainly in the final result come off second best. The importance of this consideration can scarcely be overestimated in reaching a conclusion as to the character of the defenses required by this country. If our enemy cannot transport an army to our shores, which I believe to be the case and, if as I also believe, no prolonged or serious naval attack can be made upon us by any nation which has not bases of supply of both coal and ammunition near at hand, then it would seem to be vitally important to be able to destroy such bases upon the first outbreak of War. We must then have the naval strength to accomplish this object; with less than this our ships would be forced to seek protection in our own ports and would remain there blockaded. Under such circumstances, forts might protect our cities from capture or destruction, but they could not change the final result. Our commerce would be destroyed, and its attendant evils would reach every home and industry in the land. This country must possess a navy sufficiently powerful to capture or render useless every base of supplies, possessed by an enemy, which is near our coast. With the enemy's base thus pushed back two or three thousand miles we shall have comparatively little to fear from her powerful armor-clads.

It would therefore appear that the question of the relative efficiency of forts and ships in furnishing a defense for the coast cannot be decided for us or any other nation without a comprehensive examination of all the conditions in each case. The functions of forts and ships considered in the abstract are totally different; although ships, because of their mobility, have a broader scope of usefulness than forts. So far as forts will furnish the defense required, they are much to be preferred to ships. They are cheaper, more durable, and always ready. The fact should not be lost sight of, however, that while forts may be able to resist any attack, they may not completely protect the locality, and in no case can prevent a blockade. It therefore follows that, in the first case, a naval force should supplement the forts, and, in the second case, the naval force should be sufficient to prevent a blockade, even without the momentary support of the forts.

For these purposes it is not necessary that the ships should be always present. An enemy's fleet cannot bombard a city without due warning ; and a blockade, to be injurious, must be of some duration, and the injury increases more rapidly than the duration. Therefore, if the fortifications are sufficient to resist the attacks of the enemy for even a short time, and the naval force is sufficient, and can come to the assistance of the forts within this time, we shall have a perfect defense.

If the assumption be correct that in case of War the Navy should be strong enough to destroy all bases of supply near our coast belonging to the enemy, then the strength required for this purpose would be sufficient to prevent the blockade of any port on our coast, East, West or South ; and therefore our fortifications need not be extensive.

If we start with the reverse assumption, namely, that our fortifications should defend all important points of the coast, independently of the Navy, then, I think, we would be wasting our energy in unnecessary defense, and if the Navy were not at the same time up to the strength above indicated, we should fail in the most important feature of defense—in preventing blockade and in protecting our commerce.

Lieut.-Col. S. M. Mansfield, Corps of Engr's, U. S. A.

A perusal of Major Walker's paper on "Fortifications and Fleets," reprinted in the November number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, suggests some erroneous opinions prevailing in the United States regarding coast defense. To what extent they are held I will not attempt to say, but that they do exist, there can be but little doubt.

The question of reliance upon vessels of war, floating batteries and gunboats as temporary substitutes for permanent fortifications in the defense of the sea-coast has received attention from able military men and statesmen in this country, especially during the past thirty years, or, since the application of steam to vessels of war. Arguments have been advanced, *pro* and *con*, with great force, and the whole subject has been discussed in all its bearings, with the verdict decidedly in favor of permanent land works as the leading feature of any system. The great activity witnessed in all European countries in such works, as well as in naval matters, should put the question at rest and relieve any thinking mind of doubt as to the necessity of permanent fortifications for coast protection. Notwithstanding all this, it is surprising to be told by one high in authority, in substance, that, with a superior navy at the outbreak of War, coast fortifications are of little value. Major Walker's paper, in reply thereto, is an admirable defense of permanent works, and I cannot be expected to shed new light on this question, which he has so exhaustively treated. What I had in mind to call attention to, is the feeling, that I believe still exists to a considerable extent in this country, that sea-coast fortifications are unnecessary, and that the establishment of a powerful navy is all that will be needed to protect our coast from invasion. Our present progress in naval matters, our sending of an imposing squadron to fly our flag in foreign waters, will, doubtless, lend encouragement to this belief. We may be pardoned a just pride in our latest naval achievements, a desire to show to the world what we are capable of in the way of ship-building, but it is to be hoped that the projected system of permanent fortifications for our principal sea-ports will not be entirely lost sight of, and that a beginning will soon be made in the construction of these works, in which we are now sadly deficient, and which appear to be so necessary to secure our position as one of the foremost nations of the earth.

It is idle to suppose that we shall ever possess a navy capable of performing this function of coast defense in addition to its duty of affording protection to our commerce, security to the lives and property of our citizens abroad, and of upholding our national honor in foreign lands. To employ the Navy, if we had one, in the place of

a system of permanent works would be to substitute chance for certainty; the chance of being surprised without defense through the many accidents to which a navy is peculiarly liable, against the certainty, of land defenses always ready. England is to-day more powerful on the sea than ever before, she is the acknowledged mistress of the ocean, yet she is constantly strengthening and adding to her land defenses, thus showing that her reliance is not alone upon her navy. It would seem as if any doubt of the wisdom of this policy ought to be dispelled since the recent naval manœuvres on her coast. With such an example to guide us, we ought not to hesitate. It would be simply impossible for the United States to create a navy and maintain it in that condition of efficiency that it could be relied upon to protect our extensive and disconnected sea-board, hence, we should prepare the means of defense that clearly lie within our ability to acquire and maintain in perfect efficiency.

Another mistaken notion, and one quite prevalent, is that our present fortifications are useless and will serve no purpose whatever as a defense against modern ironclad ships, that they will have to be removed to make way for new structures, or be abandoned altogether. This view is entirely wrong. If we had no such works, their sites, or those which were deemed advantageous, would no doubt be occupied by works of a very different character, but it is believed that but few, if any of them, will be discarded as useless, or be in the way of new works.

Under the present approved scheme of coast defense, they would be incorporated with it and become an important factor. We shall not build any more of the elaborate and expensive masonry castles characteristic of our *ante bellum* days, but will discard masonry wherever possible, and mount modern artillery of increased range behind suitable earthworks on disappearing carriages, or in pits, with bomb-proof cover for magazines, or in iron turrets and behind shields, when earth works are impracticable; using a fewer number of guns, but of higher power, and distribute instead of concentrating them as before. We will occupy stations to command a more extensive field, and make it impossible for a hostile fleet to approach near enough to reach with its fire the cities, navy-yards or depots, that are the object of attack. Our present works, generally, are not sufficiently advanced for this purpose, to say nothing of their inability to hold out against modern ordnance on war-ships of the present day, but they will serve to cover the channels of approach in connection with mines and torpedo devices, which are a most prominent feature of our new system.

It is the duty of the Government to afford adequate protection to our sea-coast, by providing fortifications which will exclude an enemy's fleet from entrance to our harbors, and render them available for our own vessels while preparing for operations on the ocean.

Our defense includes fortifications and fleets; both are indispensable to a perfect defense, and each has its place in the new and approved system of to-day.

Our Navy is now being placed upon a substantial footing, but the requirements of permanent land defenses must not be overlooked, so that their construction will be long delayed, for a Declaration of War against us, would be immediately followed by the presence of a powerful fleet off some one or more of our principal ports and we would be powerless to oppose it.

BOSTON, MASS., Nov. 20, 1889.

Lieut. Bradley A. Fiske, U. S. Navy.

In case we were called upon to decide whether our coast should be defended wholly by forts or wholly by ships, we might remain long undecided which to employ; but we are not—and shall not be—called upon to decide anything of the sort. The country

being willing to expend a given sum to defend its coast, the question is, How shall this sum be apportioned?

It would seem as if Major Walker had epitomized the whole subject in the sentence : " A satisfactory defense of the Empire can only be obtained by a just combination of all the elements of defensive strength—ships, forts, material obstacles, organization of men." For Great Britain, he admits that ships are the most important factor ; and he further admits that if a navy is sufficiently stronger than the enemy's navy, then fortifications need not exist, but he follows this admission by showing how uneconomical it would be to make a navy strong enough to do its own proper work and the work of land defenses also. And the opinion of a board of British admirals supports him. When the Achill squadron broke the blockade at Bantry Bay last year, Admiral Fitzroy with the *Rodney*, *Warspite*, *Iris* and *Severn*, made a sham raid on the enemy's coast. At Aberdeen the estimated damage supposed to be done was £400,000 ; at Edinburgh, £1,000,000 ; at Shields, £500,000 ; at Newcastle, £1,000,000 ; at Sunderland, £1,000,000 ; at Hartlepool, £500,000 ; at Scarborough, £500,000, and at Grimsby, £500,000, all in two days. This was almost in the presence of a hostile fleet from which they had just escaped, and the board of admirals remark in their report : " It is unnecessary to point out the incalculable mischief which so enterprising an enemy might inflict in even that short time, and how imperative it is to complete the military defenses of our great commercial centres without further delay."

On our long coast, with its wealthy cities lying invitingly open to the swift and powerfully armed cruisers of the European powers, the necessity for forts is so absolute and so clear that it seems absurd to urge it. Equally is a fleet necessary, since it is obviously impossible at any reasonable cost to fortify all our harbors impregnably. It would seem as if all ends were best served by fortifying our principal cities to such a degree as to enable them to defy, unassisted, any attack, except a determined onslaught by a large fleet, and to resist even such an onslaught until the arrival of the coast defending fleet ; and this fleet should be powerful enough to overcome any enemy's fleet under these circumstances. It need not be said, the larger the fleet the better ; but the above is intended to indicate the *minimum power* our coast fleet should possess.

What the precise balance should be between ships and forts, how much should be spent on one, and how much on the other, is perhaps as difficult a thing to decide as can well be imagined. But one thing no one will deny, and that is that both the sea and the land defenses should act together as two parts of one force, and that the system of signalling and all the means of communication between them should be the subjects of deliberate planning and unremitting care. In the English naval manœuvres last year : " The work done by the coast-guard signal stations in transmitting intelligence was most valuable. * * * The necessity for making the signal stations around the coast accessories of the naval defense was fully presented by the manœuvres. Both Admiral Baird and Admiral Tryon were entirely dependent for a time upon the information thus furnished."

It need hardly be pointed out that the worst thing which could arise is one that, unfortunately, has often arisen ere this, a foolish jealousy between the two branches of the Service. It is claimed that one of the many reasons for the admirable discipline of the German Army is the absence of jealousy between commanders and between different branches of the organization, and the wonderful enthusiasm with which all work together for Fatherland. Doubtless this spirit—this generous spirit—will do more than any other one thing to bring us to the correct solution as to the proper balance between Fortifications and Fleets. And let us avoid half measures. Let us have forts equipped with every device that science can suggest and money buy ; and let us not be content with pretty cruisers whose best point is the speed with which they can run away,

but let us insist on powerful battle-ships capable of seizing a desirable position and maintaining it. Who can tell what would have happened had we not had, on a certain bright Sunday morning at Hampton Roads, a little *Monitor* capable of doing just this thing?

HOTEL BERESFORD, NEW YORK, Nov. 29, 1889.

Capt. John G. D. Knight, Corps of Engr's, U. S. A.

In the November number of this JOURNAL, was reprinted an article written for English readers, but worthy of our own attention. "Fortifications and Fleets," by Major G. R. Walker, R. E., which originally appeared in the *Journal of the Royal United Service Institution*, with a few modifications, would have passed for a study of the question made on this side of the Atlantic. Here, as well as in England, many are apt to consider the sea alone as a sufficient defense; others, that we are "peaceful traders, loving justice and mercy," though we may not all be prepared to also love "free trade." Another class, however, exists with us alone: a class confident that the inventive genius of an Ericsson will always be able to rescue us from a threatening *Merrimac*; a class unmindful that wars are begun and ended in less time than was required for the construction of a *Monitor*; unmindful that the contract time for building the dynamite cruiser *Vesuvius* was twelve months; that the contract for building the cruiser *Baltimore*, which has just made her second trial trip, was executed December 17, 1886; that torpedo cable is not an article which manufacturers keep in stock.

Major Walker first takes up in detail, six propositions advanced by Admiral Colomb, by which the Admiral desires to establish that its superior Navy is a sufficient defense of the coasts of the British Empire. One of these propositions favors our construction of coast defenses, inasmuch as the Admiral admits therein that land forts are useful to the inferior naval power. Another holds that enterprise against an enemy's territory or fortresses, must always be abandoned if there is the least chance of the loss of command at sea. The Bantrey Bay, and succeeding manœuvres of August, 1888, did not substantiate this. Then two divisions, blockaded by two other divisions of two squadrons, not only escaped, but also eluded their pursuers, and caused mimic havoc on commerce, and in ports of the north of England and of Scotland. The comment of the *Illustrated London News*, was: "It is now quite evident that our great commercial ports, the Mersey, the Clyde, the Tyne, and the Humber, and all the shores of North Britain lie at the mercy of a naval enemy passing westward of Ireland and from the Atlantic to the North Sea."

The contention of the Admiral that fortifications have never resisted a determined attack by troops landed from ships, warns us of the possibility of such an attack. This must be resisted by land forces, and while it is not admitted that an enemy can, sooner than ourselves, concentrate a superior land force at any fortified point of our coast, we must bear in mind the aid which steam lends to rapid approach and speedy landing.

With Major Walker we agree that the most hazardous statement of Admiral Colomb, is his endeavor to establish the superior economy of ships over landworks because of the greater durability of the former. The claim is not one of relative perishability of materials; but of durability of the systems employed. From 1816 to 1860, we have had but one system of coast defenses: then rifled guns and armor plating necessitated a change. This change was in progress when suspended by lack of appropriations; and will be continued on substantially the same lines when appropriations are again made. Have changes in naval systems been less frequent? We should not infer that they have. A monitor is being converted into a battle-ship; the Austrian battle-ship *Lissa*, built in 1869, is now declared obsolete: our *Juniata* and *Quinnebaug*, the one

built in the early days of our last War, the other completed in 1877, are the latest addition to the "condemned list;" a recent wail from France is that two armor-clad fleets built in less than forty years no longer answer their requirements, and to-day a third is being outlined, in advance of all maritime powers, but with the prospect of being rapidly surpassed. Nor can the superior economy be shown when actual cost is considered. No one will contend that twenty-five modern 1st class war-vessels ready for service, if tied to our coast, could defend it throughout its entire extent; yet they would cost as much as all our proposed defenses of lake, gulf and ocean coasts, with armament complete; thirty-five cruisers, like the *Maine*, without their armaments, as much as these defenses in like condition; three such vessels, without their armaments, more than all the proposed mortar batteries, completely equipped, capable of making highly dangerous the anchoring of war vessels within a range of five and a half miles, while the mortars themselves could hardly be injured.

The general questions of ships, or fortifications for the coast defense of America was considered in 1851, when several officers of our Navy reported their opinions on three points relating to coast defenses, of which one was: "What reliance could be placed on vessels-of-war, or of commerce, floating batteries, gunboats, and other temporary substitutes for permanent fortifications." The officers were Commodores Morris and Perry, Commanders Cunningham and Dupont, Lieutenants Lanman, Maury and Dahlgren. Not one of them considered that substitutes could be had for permanent works. Commodore Morris wrote that no safe reliance could be placed on these substitutes, unless they should be multiplied to an extent requiring an expenditure unreasonably great, and much greater than would give equal security by a judicious combination of permanent fortifications and a floating force; Commodore Perry stated that it would be unwise to neglect a reasonable system of permanent defenses upon the coast. Lieutenant Dahlgren well said, that the ship and the fort have each a particular province in every general system of well regulated national defense.

Thirty-five years later, in 1886, Commander W. T. Sampson writes: "If the Navy proper is held for coast defense, then other important duties must be largely neglected, and some of the most efficient means of bringing the enemy to terms be disregarded. A naval force which is adapted to the wide range of its duties is not adapted to the work of defending a coast." His words were verified two years later, by the August, 1888, naval manœuvres already mentioned.

Admiral Colomb finds no support in the example of France, which to-day has 283 forts, or batteries for coast defense, notwithstanding its fleet of more than 100 armor-clads and cruisers, and fully twice this number of torpedo, gun and dispatch-boats.

Leaving this discussion, Major Walker, touching upon the location of coast defenses, gives greater prominence to points favorable to landing an invading force, and to military ports, than to commercial ports. For us, the reverse order is the more suitable; our commercial ports would probably first receive the attention of an enemy, their wealth alone marking them as a prize to be coveted; next, our navy-yards.

A rough, brief classification of works of coast defense follows. Three classes are given, and it is a satisfaction to read that of the three, the one which is now most in favor in Great Britain, is the one to which our military engineers gave great attention twenty years ago. We read that "every emplacement now being built throughout the Empire, is of this class:"—earthen *barbette* batteries. Both for guns and mortars, this class promises good results at small cost.

Paying some attention to the land fronts of coast defenses, and to the personnel of garrisons, Major Walker closes with a reference to John Bull, as fond of boasting that he is a peaceful trader. This recalls the growing danger threatening us in this very character of a trader. In the November, 1889, number of *Scribner's Magazine*, J.

Russell Soley considers the effect on American commerce of an Anglo-Continental War, and clearly shows that "in its character of a commercial neutral, with an immense export trade, it [this country] is sure to find itself a mark for encroachments and aggressions." Once let provisions be declared contraband of war, a declaration by no means improbable, and the declaration enforced "means the collapse of our foreign market." He may well close with the warning contained in the same article that so long as our sea-coast cities and maritime interests remain unprotected as at present, our population, area, credit, wealth, and all other elements of potential strength, will serve but little purpose in securing a respectful hearing from belligerent aggressors.

II.

"Military and Naval Pensions of the United States."

Gen. Horatio C. King, late N. G., S. N. Y.

I DON'T think I can add very much to the information which is contained in General Howard's admirable paper,* but I am impelled by the importance of the subject to respond to your call to open the discussion.

I feel, and I am sure you all do, that this is the proper place and occasion to voice the sentiments of many veterans in regard to the pension question. It seems to me, too, that it is high time the general public as well as veterans should take an active interest in this matter.

Now there can be no question, I am sure, in respect to the generosity of this Government. It can hardly be said of the United States, as it has been said of some nations of Europe, that :

"When the soldier asked for bread,
They waited till he was dead,
And gave him a stone instead,
Sixty and one feet high."

In 1871, six years after the close of the War, when it would naturally be supposed that every invalid, widow, orphan, or dependent had filed their claims for pensions, the entire appropriation for pensions, in round numbers, was \$34,500,000. In 1875 there was a reduction to \$29,500,000 ; in 1876, \$28,250,000, nearly a million less ; in 1877, 12 years after the War, the pension appropriation was reduced to \$27,100,000. Then by organized effort, instigated and stimulated by claim agents in 1878, Congress increased the amount to \$35,000,000, nearly eight millions gain. In 1880, stimulated by the success of former years, the agents went to work and secured an increase of seven millions, and now in 1889, twenty-four years after the War, instead of a decrease, which there naturally should be, the amount of pension appropriation is \$88,275,113.06, an amount equal to the total expenses of the Government immediately before the War, and I understand that on account of numerous re-ratings, the appropriation for this year will reach at least \$100,000,000. Let me say here also that the arrears of pensions which it was asserted would not exceed forty millions of dollars, have actually reached \$200,000,000, and there are on file, I am informed, unsettled claims calling for two hundred million more.

I realize very well that it is a very unpopular thing for any man to speak against, or antagonize in any way, this constant increase of pensions. He is warned by political workers that if he desires the votes of the old soldiers he must help to keep it up ; to give every comrade, widow, minor or dependent person large pensions. Yet, as a soldier in the War, I think that it is about time to cry a halt, and endeavor to see that the generosity of the people shall not be overstrained or abused.

*See page 1.

Now, one of the bills before Congress is a per-diem bill, which has many conscientious supporters, and another which is known as the dependent or pauper pension bill. The per-diem bill proposes in substance that one cent per day shall be allowed for every day's service ; that is, if a man served one year his pension shall be \$3.65 per month, and so on.

I suppose that no one can give even an approximate estimate of the number of survivors of the War, but there are certainly not less than 1,200,000.

I am not very good at figures, but any one can see that at one cent per day, future administrations would be relieved of any consideration of that embarrassing problem, "How to get rid of the surplus?" The pauper pension bill has in it some excellent provisions provided they can be honestly executed, so as to reach the really needy and deserving.

It is easy to excite public sympathy, especially upon the stump, by declaring that no old soldier should be allowed to suffer. And I agree with that sentiment ; but the Government should see that the class of men who make no effort to care for themselves shall be cared for by a paternal hand, and not by ill-considered bounty. As one sows so one reaps. If men have, by vicious habit, sapped their vitality and brought themselves to extreme poverty, I question very much whether it is wise for the Government to pay out large pensions to such. But I do say, most earnestly and emphatically, that no indigent old soldier should be permitted to go to the poor-house, even though his ills are of his own making. We want no poor-house for old soldiers. We want more Homes. General McMahon, the Secretary of the Board of Commissioners of Soldiers' Homes, surprised me the other day by telling me there were already more than four hundred men in the Homes in excess of their prescribed capacity, and because of the limit prescribed by law, many applicants have to be refused admission. Congress should promptly provide more Homes, with ample provision for the comfort and enjoyment of those who cannot take care of themselves.

There is one way to reach men of this kind ; and that is, in the next census it should be provided that every census-taker shall furnish every old soldier a blank on which he could write out his complete record, history and condition ; such a record would also be a most valuable aid in the proof and payment of unsettled claims of which many thousand are suspended because of defective evidence.

I have been told that there are 475,000 unsettled cases now on file in the Pension Office, and 28,000 still unexamined. This may come from an insufficient number of clerks, or from a rule that requires the evidence of disability to be made by one commissioned officer, or two enlisted men. Well, I don't know but that at this period, almost twenty-five years after the close of the War, the evidence of one enlisted man is not as good as that of a commissioned officer. But anyway, for want of such evidence, thousands of pension claimants are dying off, bereft of the aid which their necessities demand and to which many are doubtless entitled. Now, if there are not clerks enough then more money should be voted to secure sufficient clerical force to pass promptly upon all claims, and stop, what I regard, a disgraceful condition of affairs.

What I have said is entirely unpremeditated. My figures were used in former remarks and are fresh in my memory. I want to say this, before I close, that I do not think this matter should be left to whims, caprices and avarice of lobbyists, and I do not like to have old soldiers imposed upon by such people, who use their influence in securing improper legislation.

As to a service pension as a reward of merit, I am inclined to think the needs of the bulk of the veterans do not at present require, nor are they standing hat in hand begging for, it. At the proper time this recognition will be made—but following the long established precedent, it will be when the average age shall be about sixty.

I hope this discussion will invite a thorough sifting of the matter, throughout the land, and that the voice of the old soldiers shall be freely and fully heard.

Maj.-Gen. O. O. Howard, U. S. A.

I want to say that there is an enormous list of unsettled claims which, owing to the lack of sufficient evidence, are gradually increasing in number; and that it will take, to settle the just claims, an enormous appropriation. It would have been so, particularly if the re-rating that was started had continued.

In view of these facts, I am afraid we may lose our pension list altogether if we are too greedy: I do not think it wise to endanger our present status.

The country at large sees how thoroughly the Grand Army work is done. It is growing, and no worthy soldier will come to the "poor-house."

I think we are so circumstanced as to wait and see whether Congress will not grant some wholesome pension act, as in the case of the Revolutionary pensioners, thirty-five years after the Revolution, or better, fifty-seven years after the War of 1812.

If we begin a *Service Pension* fifty years after the War of the Rebellion it will be in ample time.

It is not long, in my eyes, to 1915, the Jubilee year.

Gen. Egbert L. Viele, U. S. V.

The admirable paper of General Howard has many points of special interest, besides being a resumé and clear analysis of the pension system from its first inception to the present time, and it will undoubtedly afford a great deal of information to those whose duties require them to deal with this subject. There is an unquestionable necessity for a complete and careful codification of the pension laws, so as to avoid the complicated rulings that have in the past created so much confusion and dissatisfaction, not to say injustice. That an undue advantage has been, in the past and is in the present being, taken of the generous impulses of the Nation to secure, by fraud and misrepresentation, money from the Treasury for the undeserving is evident to any one who has taken pains to examine into the methods by which pensions are obtained; while on the other hand many meritorious cases have failed to meet with justice. The question is, how to obviate fraud and how to secure justice? In the first place, there is a class of men known as claim agents, who are supposed to be a necessary evil, and old soldiers are led to believe that they and they alone can secure their just dues, while many unworthy persons seek their aid to obtain what is not justly due them. It would seem to be a wise policy for the Government to employ competent persons to receive the statements of those who think they are entitled to pensions, and to embody these statements in the proper forms of applications. A bureau especially charged with this duty, under an officer of the Adjutant General's Department, would certainly act as a barrier against fraudulent claims, would save to the Government many times its cost while saving to the soldier all the expense now exacted by the claim agent. I have had something to do with pension legislation, as a member of Congress, and I saw enough of the workings of the system to convince me that there was great room for improvement. Having introduced a bill in Congress and secured its passage granting a service pension to the survivors of the Mexican War, I was greatly surprised, after I had myself, in course of time, become entitled to this honorable distinction, to receive a notice from a claim agent in Washington that *he* had secured the passage of the law and demanding compensation from me as a beneficiary.

I agree with General Howard that a Commission should be appointed to take up the whole subject of pensions, with a view to secure a clearly defined policy, free from doubt and subterfuge, and equitable in all its provisions. I think the General has done

a great service, to all interested in this matter, in placing before us such a comprehensive statement of the case.

Gen. H. C. King (Additional Remarks).

I do not think men are entitled to large pensions simply from the fact that they have saved the Government. I do not want to throw discredit here upon the business of getting pensions for old soldiers, but is it not true that in nine cases out of ten these claims for increase do not originate with the old soldier? How many never thought of an increase until they received a circular (and most of us have received them) from a claim agent? They will get your claim through, or will get some influential person to push it through; then comes another circular: "You are entitled to a pension or an increase; send me ten dollars and I will get your application through."

Now, the time is coming when the men who are paying taxes, the younger generation, will want to know, When is this thing going to stop? They will say: "Are we always going to pay war taxes? We are ready to take care of the men that were wounded and maimed, but this increase of pensions must stop," and I am afraid instead of getting a dependent pension and a service pension, in the not remote future, a reaction will set in and beneficial legislation cease.

I am proud to say that the great mass of *the old soldiers of America are still able, thank God, to take care of themselves a little longer.*

Lieut-Col. J. L. Follett, N. G., S. N. Y.

I have listened with pleasure to General Howard's valuable contribution on the subject of pensions. I am in harmony with his remarks. I do not, however, regard this a generous republic. I think, if we will refresh our memories, we will all say the same.

I had the honor to serve in the Army from the breaking out of the War to the close. I have never received a pension or bounty.

If you remember (those of you who participated in the War), a soldier was to receive a certain amount of pay a certain amount of clothing, and a certain amount of rations. I do not know where General King served; but where I was (General Sweeny was there also) we rarely received *half* rations, and sometimes no rations at all.

[Here the speaker was asked by General King, in what army he served?]

I was in South-west Missouri.

General King replied: I was in the Army of the Potomac.

Well, the Army of the Potomac was always better fed, I believe.

Now then; if you remember, under this contract, he was to receive a certain amount of rations, clothing (which was principally shoddy), and he was to receive a certain amount of pay, in greenbacks worth forty cents on the dollar.

A soldier who served faithfully for his Government in her hour of danger is entitled to a just and a fair pension.

We should hear less talk about generosity. This Government cannot do enough for the soldiers who marched and fought in its defense, and I think it very poor policy to let any such men die in the "poor-house."

Lieut. J. C. Bloom, (late) U. S. Army.

I have listened to General Howard's paper with great interest, not as a soldier, but as a citizen, and because I am deeply interested in the subject of pensions. I was not in the recent war, and think that those who remained behind want the matter arranged in an economical and fair manner. I see no reason why the men that remained at home should not do something for those who went to the front in the time of danger.

I can readily understand how a service pension law can be framed so that those in need would receive a proper and fair amount, and it seems to me that they should. I know no better way than by an unanimity of opinion amongst ourselves. If you will unite upon some definite plan of action and form some general estimate, I believe that it can be adopted.

Speaking about an estimate reminds me of an occurrence when I was an officer in the 4th Artillery. I was detailed to draw up plans for some improvements at Fort Canby, I was post quartermaster ; I did so ; I think my estimate was about \$1,300, it was for the erection of a cottage. The estimate was first submitted to the post commander who cut it down about one-third, in that shape it went to Oregon to the chief quartermaster, at all events it reached San Francisco, where it was again cut down. The Quartermaster-General's Department in Washington finally diminished it to at least one-third the original amount ; in that shape the appropriation was obtained and the result was the cottage we erected, on the small amount allowed, was very poor. Now, if all these officers, to whom the estimate was submitted, instead of cutting it down, had increased it, I have no doubt the sum would have been appropriated.

Now, if you do not make your estimates large enough to allow them to be cut down, you will get but a very small appropriation in 1900; therefore, it seems to me, we must determine upon some plan and recommend it, and I have no doubt it can be adopted.

J. Joel, Esq.

I have listened with a great deal of pleasure to General Howard's paper on pensions. I have given this subject a great deal of thought and careful study. There were two classes of soldiers during the late War, one short-term and others who were long-term soldiers. There were two bills introduced into Congress, one was known as the "Per-diem Pension Bill," and the other the \$8 per month bill ; a man who served 60 days would, under the per-diem bill, of one cent a day, receive 60 cents a month pension, and a man who served a year \$3.65 monthly. I believe that we can have a service pension bill, and that less evidence should be required of the claimant to secure him his just dues ; what we want is justice to all.

This question will come, and if we have the courage to get up and advocate it, justice will be given to men who stood shoulder to shoulder and fought for their Government. There is no doubt that we shall get at it all in time, and that we will arrive at some definite decision on this subject.

I have just been asked what all this would cost ? I have been figuring upon this for months. The amount given in our Pension Reports for 1888, is \$12,300,000 and the number is about 6,500 pensioners. I find from inquiry at different insurance offices, that the soldier, to-day, is better preserved than the ordinary run of citizens.

The per-diem service pension bill would call for about 45 millions, and the \$8 per month bill, for 60 days service, estimated from 137 to 140 millions.

Brig.-Gen. T. W. Sweeny, U. S. A.

I move that a vote of thanks be extended to General Howard, for his very able and interesting paper, and that permission be requested for its publication in the JOURNAL. Carried unanimously, and the meeting was adjourned.

III.

"The Desertion Question."

Col. Richard I. Dodge, 11th U. S. Infantry.

To the *Army and Navy Journal* I contributed a short criticism (Sept. 28th, 1889), on the very able article by Lieut. McAnaney (JOURNAL M. S. I., Sept., 1889).

From the very great number of articles on this subject that have recently appeared from all classes and grades of Army men, each as a rule differing from all others, it must be conceded that the question is as far from solution as ever and the cause of desertion like taste, "*non est disputandum.*"

Among the several articles on this subject in the JOURNAL of the Institution of November, is one specially commending Lieut. McAnaney's third reason: "The low social position of the enlisted man" and insisting, in elaborate argument, that *Military Caste* is at the bottom of the trouble.

Outside of India there is no society in the world to which the term "caste" can properly be applied. As used by us, the word indicates simply the rank, grade, or place in the general society held by each individual, but which (unlike caste in India) is liable to be changed at any time by special ability or the reverse, wealth, poverty, or even mere accident. This kind of caste (meaning that individuals in certain positions as to intellect or pecuniary means, or business association prefer to choose their associates and friends from among individuals similarly situated) is as old as society itself and will continue as long as society of any kind exists. Even among socialists, the most rampant theorists for *égalité* and *fraternité*, this kind of caste holds as full sway as in any other less pretentious society.

As I understand the argument, the special point is, that while caste in civil life is eminently right and proper, caste in military life is unjust and tyrannical, "because a law stands behind it."

The value of all argument and criticism depends on the truth of premises. The article referred to assumes that "a court-martial stands ready for the officer who associates with his men." There is no law or regulation prohibiting such association. It is a matter of custom only. I have had a private soldier a guest at my dinner table, and I contend that I have violated no military law or principle.

Admitting that charges under the 62d Article of War may be made against an officer for "associating with his men," the onus of proof that such association is "prejudicial to good order and military discipline," must lie with the prosecution. The result would depend entirely on evidence whether in that particular case the association was or not to the prejudice of good order and military discipline.

I put charges (which resulted in dismissal) against an officer who was found drunk with his men in a public bar-room. I have heard of another who was forced to resign for gambling with his men. In these cases the association was undoubtedly "to the prejudice," but it is easy to imagine or experience cases where such association could be productive of nothing but good. Much as he deprecates these fancied "terrors of the law," I know the writer of that article so well as to be assured that he would risk all these terrors and take to his heart and home the son of his old friend and class-mate just as readily and as warmly as if he were not an "enlisted soldier."

An officer of the Army once covered himself with the contempt of myself and other officers present, by refusing, at a public hotel, to dine at the same table with two enlisted men, all of us being in uniform and the enlisted men behaving with perfect propriety.

It is claimed that our "caste" exclusiveness comes from the English. Having

once been a part of Great Britain we naturally took many of our ideas from that people, especially those regulating the military and naval services. But the English are not responsible for this exclusiveness. It is an inheritance from the feudal ages.

It is a curious fact, not however generally recognized, that the lack of personal association between officers and privates is to-day more pronounced in Germany, Russia, and other European countries than it is in England or the United States.

In Germany a conscript may be assigned to a company of which his brother is captain, yet there can be no *association* between them. Not only so, but a brother, a corporal, can have no association with his brother, a private. A broad line is drawn between the non-commissioned officers and the privates. A private in speaking to even the lowest corporal must stand at attention and address him as "Sir." This admirable adjunct to discipline is maintained by large increase of pay and personal consideration to the non-commissioned officer, a corporal of the lowest class receiving twice, and one of the highest class, three times the pay of the private. The sergeants receive from four to five times the pay of the private. These non-commissioned officers have their own mess and club, and "associate" only among themselves. In short, the "exclusiveness of caste" sought now to be established as the great cause of desertion in the Army of the United States is infinitely more pronounced in the German armies, in which there is very little desertion.

Within comparatively recent years individualistic, socialistic and philanthropic ideas have occupied the time and attention of great numbers of men of influence, and from these no class of people in the world has received as much comfort or made as much progress in the social scale as the enlisted men of the United States Army.

Forty years ago the enlisted man was simply a machine—to fight or work, as occasion required. Scattered in small posts over our vast frontier, quartered in little huts built by themselves with air space in many cases less than 100 feet per man, their beds, three-story bunks in which nine men were packed three together, their bedding, a bedsack (stuffed with prairie grass) and a scant supply of blankets, their food, the ration pure and simple, their pay sometimes six months in arrears; and individuals were confined in the guard-house often for ten months awaiting the assemblage of a court-martial for their trial. Whipping and branding were authorized by law. From the difficulty of assembling courts-martial, company commanders were permitted to control their companies pretty much as they pleased. Beating, bucking and gagging, the wooden horse and tying up by the thumbs were constantly resorted to. No books, no schools, no instruction except in drill; no effort at improvement, moral or social; the soldier was a mere animal, treated with as little consideration as a refractory mule, and had as little social standing.

Personal courage in the Mexican War had given commissions to a few, but there was no *legal* provision for the advancement of the enlisted man to such commission. His future was a hopeless blank—the death of all ambition.

Compare his condition then and now. Concentrated in larger posts, magnificent quarters, each man provided with a bed as luxurious as that on which the Emperor of Germany is said to sleep, food as good and varied as that of their officers, pay prompt, no punishment except by sentence of court-martial, at every post daily papers and magazines, a library and school of instruction for its enlisted men, games and athletic sports encouraged, and at regimental posts and others where a band can be made up, dances given for and by the enlisted men, to which flock young girls from all the neighborhood. The soldiers' dances at Fort Sully, Dakota, were attended by the best citizens in all the country around. Unfortunately, when stationed in older communities, there is always some soldier contemptible enough to bring to these dances women of bad character, lowering by association the social standing of all.

This can never be remedied until the best class of soldiers take the matter in hand and drive from their association the man and woman. There is an old adage, "It's a dirty bird that fouls its own nest." There is mathematical certainty that "a chain is no stronger than its weakest link." Let the self-respecting and respectable element (largely in the majority) assert its manhood and insist that "the dirty bird" shall not foul the common nest, and the weak and vicious links of the chain of military brotherhood will soon be eliminated, to the elevation of the social status of all.

Every grade of society contains, more or less, dishonorable and vicious men of which it alone can purge itself. Commissioned officers of our Army keep our brotherhood clean by ostracising or dismissing its disreputable characters. Let the better class of enlisted men try this course on those who degrade them, and a higher social standing will soon result.

As I have said in a previous article on this subject : "There is no power in the War Department or in the Government to elevate the social position of the enlisted soldier. He must do it for himself."

When the status, social, intellectual and ambitious, of the enlisted man was infinitely lower, desertion was comparatively rare. When infinitely higher, desertion is frequent. His social position is not, therefore, logically the cause of, or a reason for his desertion.

Reviews and Exchanges.

Torpedoes and Torpedo Warfare.*

ALL who are interested in torpedoes and torpedo warfare, will be glad to know that Captain Sleeman has revised and brought up to date, his excellent and well-known work on those subjects. This work contains a vast amount of information relative to the history, development and use of torpedoes, and describes nearly all the instruments, materials and appliances of any value in connection with them, whether used for offensive or defensive purposes. Illustrations are numerous, and the text is well divided into chapters, headings and paragraphs, which with the complete index table of contents, and lists of tables and plates make the work specially useful as a text-book for those who wish to learn, and as a book of reference for those who are too old, or too busy with other matters, to carry all these things in their heads.

Something less than half the book is devoted to fixed mines, or defensive torpedoes, but in that branch of the subject enough is given to enable any intelligent officer to defend a harbor, having given, of course, the men and materials. It is more particularly with torpedo boats, and auto-mobile and locomotive torpedoes that the work is concerned, and here we find all the later forms of torpedo and submarine boat, as well as experiments with and actual service trials of them.

With regard to the use of offensive torpedoes, the author remarks : " A quarter of a century and more has elapsed since the Americans first taught the world the power of the *spar* torpedo, and though, in this long interval the skill and time of naval and military scientists, and of private individuals, all the world over, have been applied to developing and perfecting the torpedo in some form or other, yet its position as a factor in naval tactics, the part it will play in future naval wars, and its proper application, still remain unknown quantities." A list of the attempts to use torpedoes in actual warfare is appended, showing that of nineteen attempts made by Russians, Chilians, Peruvians and French, only six were successful. The moral effect has been great, but the actual results must be considered as decidedly unsatisfactory.

If we were to note any additions or omissions as being desirable, it would be that more prominence might have been given to the electric search light and its accessories and uses ; and that some of the space for this might have been made by omitting the so-called " sea-cell test," which, as the author remarks, is too delicate and cannot be relied on.

W. R. K.

Battles and Leaders of the Civil War.†

To this collection Army and Navy, Federal and Confederate, Officers and Men, Staff and Line, the Newspaper Correspondent and the Hospital Nurse, have all contributed, so that instead of being digested into history according to some philosophi-

**Torpedoes and Torpedo Warfare*. By C. Sleeman, Esq. Second Edition. Published by Griffin & Co., Portsmouth, Eng. (25 shillings.)

†The Century Co., N. Y. City. 4 vols.

cal scheme or some individual interest it combines the results of observations and experience from all points of view and under all the varying fortunes of our great Civil War.

If error is not eliminated by any such process, at least more of the truth is effectively brought to notice, just as every ripple on the bay catches a portion of the sunlight and helps to throw a broad stream of radiance over the depths below.

"To lie like a bulletin" has passed into a proverb, but official reports are simply a part of the campaign and ought to be prepared, like the operations themselves, with due regard to the interests of the Service, the mystification of the enemy and the encouragement of friends.

As Prince Eugene recognizes, in War "one must sometimes work for the newspapers," if for no better reason than that the newspapers may work for you.

But these restrictions do not fetter the pens that write without reference to Congress, Cabinet or circulation.

Between what can be said by the man in the ranks and the man on horseback, the man who meets the enemy's bullet and the man who prefers to encounter the provost-marshal in the rear; between the man who has a grievance, and the man who has the glory, the public finds increased chances of getting at the facts in the case and nowhere, either in official reports or in personal memoirs, are they presented with so much fullness and variety as in the four volumes under review.

Of these the first, beginning with "Washington on the eve of the War," concludes with the loss of the *Monitor*, the second carries on the course of events as far as Corinth and the third closes with "Longstreet at Knoxville."

The campaign that began with the Wilderness and ended with Appomattox, those of the Shenandoah Valley, the March to the Sea, with its verification by the battles of Franklin and Nashville—for what shall it profit a Nation if it gain Savannah and lose Cincinnati—naval and military operations in the Department of the Gulf and along the Atlantic Coast form the contents of vol. 4, which concludes the series and possesses an elaborate index to the whole work.

Very thorough statistical information as to the composition of the armies and the respective governments, the strength and losses of the forces engaged, an account of events preparatory to the War, and a running comment of note and explanation upon the text, the maps, illustrations and sketches, all complete, and carry the history up to a degree of excellence that cannot fail to commend it to the general reader and make it of special value to the military student, while it may be added that print, paper and binding correspond to increase the satisfaction of the man who loves to see in his literature not only a *curiosa felicitas* of content but also the *simplex munditiis* of appearance.

General Hill, in a very interesting article upon the battle of South Mountain or Boonesboro, says: "So many of the battle-fields of the Civil War bear double names that we cannot believe the duplication has been accidental. It is the unusual which impresses. The troops of the North came mainly from cities, towns and villages, and were therefore impressed by some natural object at the scene of conflict and named the battle from it. The Southern soldiers were chiefly from the country and were therefore impressed by some artificial object near the field of action. In one section the naming has been after the handiwork of God, in the other it has been after the handiwork of man."

It is quite possible the differing civilizations of the two groups of States, leaving their mark so strongly upon the institutions and sentiments common to each, may also have differentiated their nomenclature, but a more prosaic reason can perhaps be found in the opposite directions from which the armies drew near one another.

As the Northern forces left behind a landing, a mountain or a stream, they called the subsequent conflicts accordingly, to which the Confederates gave a name from the church, the village or the station by which they passed to the same battle. The reader can test either theory from the names below quoted from the paper in question :

Boonesboro,	called by the	Federals,	South Mountain.
Manassas,	"	"	"
Leesburg,	"	"	"
Shiloh,	"	"	"
Murfreesboro,	"	"	"
Cold Harbor, name of a tavern,	"	"	"
Elk Horn, " " "	"	"	"
Sharpsburg,	"	"	"
			Bull Run.
			Ball's Bluff.
			Pittsburg Landing.
			Stone River.
			Chickahominy.
			Pea Ridge.
			Antietam.

Similar instances for similar reasons occur in European history.

Marlborough gave the name of *Blenheim* to the battle fought in the vicinity of that village, called, however, by the French, *Hochstadt*, because that was the village nearest them.

So the Prussians speak of *Sadowa*, but the Austrians of *Königgrätz*.

There is no romance, however, in the General's statement that "The noisy speakers of 1861 who fired the Northern and the Southern hearts never did any other kind of firing." And they keep it up now with no less readiness and no more exposure.

In these war papers can also be found what will in vain be looked for in many a more pretentious history, some intimation of actual battle formations and details as to calibre and range in the matter of siege artillery.

At the attack at Fredericksburg, General French was directed to prepare his divisions in three brigade lines at about two hundred yards distance, and Hancock to follow in the same order.

At Chickamauga, Longstreet's troops were placed in columns of brigades at half distance, Hood's division massed five brigades deep.

At the reduction of Ft. Pulaski, which marks an era in the art of fortification, there were employed twelve 13" mortars, six 10" columbiads, four 10" siege mortars, four 8" columbiads, five 30-pounder Parrotts, five James rifles, the latter being the old 24, 32 and 42-pounder smooth bores, rifled and carrying double weight projectiles, 48, 64 and 84 lbs. respectively. These were used at ranges of about 3,000 yards for the S. B. and 1,650 for the others, and did the business very effectually in spite of General Totten's belief that the fort "could not be reduced in a month's firing with any number of guns of manageable calibres."

As for our old friends, the 13-inch mortars, it causes no surprise to learn that though "carefully and fairly well served, they were from some cause practically inefficient, not more than one-tenth of the shells falling within the fort."

It is to be hoped that the modern rifled mortar will redeem the expectations that seem to be cherished in regard to its accuracy.

General Wheeler, in his paper upon Bragg's invasion of Kentucky, notices how the War divided not merely States but families. "Friends, neighbors, kinsmen and even brothers bade each other adieu and separated, one to the Northern and the other to the Southern forces."

Of the Crittendens two brothers served in the Union armies and one in the Southern. Of Henry Clay's grandchildren, three and four respectively. Of the Breckinridges, the Vice-President and three sons were on one side and his cousins, the eminent Presbyterian divines, on the other. Of the elder of these cousins two sons served in the

Confederate and two in the Federal armies, and in the battle at Atlanta one of these brothers became a prisoner to the other.

Blood is thicker than water perhaps, but it is certainly thicker than ink, and is now beginning to assert its color over the sombre assertion and terminology in which the earlier passions of the War found relief.

The smoke of battle is a good disinfectant and its flames are a wonderful revelation.

In General Buell's paper upon Perryville is an interesting study of the effect upon the War of sectional characteristics, whether displayed in viewing the contest as an enforcement of the Constitution and the laws upon the whole country by the North, or as an appeal to revolution and independence on the part of the South, leading in the one case more to collective action with the method and delays of a public policy carried out by representatives already in possession of the traditions, channels and customs of the old Government, and in the other to the desperate energy of individual enthusiasm, unshackled by precedent and careless of former habitual limitation and restraint.

Then throughout the War, for the most part, the North was the invader, and the contest was pushed farther and farther into the heart of the South, requiring and consuming the superior resources of the Unionists. Personal differences between the two sections and the simpler mode of life to which the South was accustomed, affected the questions of supply and transportation largely in its favor. The populations of the South if less metropolitan were more nomadic. Their knowledge had not been picked up at academies so much as by field and stream, and they knew more of cross-roads than of classics. They were more accustomed to rely upon what they could do and less upon what they could get.

These tendencies gave for cavalry and infantry a ready-made material, the preparation of which in the North took time and experience.

It is evident enough, also, that the South were too wise to go into their political underbrush for military timber. Lee, with his corps commanders, Longstreet, Jackson, Hill, Ewell and Stuart, possessed and held the confidence of the country from the beginning, nor were their movements dominated by the assumption or timidity of governors or committees.

Gen. Gilbert quotes a curious incident. The evening before the battle of Perryville, Terrill, Jackson and Webster, in discussing the chances of being hit, agreed that men would never be frightened if they only took into consideration the theory of probabilities and recognized how slight the chance was that any particular person could be hurt. In the next day's fight all three were killed.

In the account of the siege of Charleston we find the *Swamp Angel* to have been an 8-inch Parrott, fired at an angle of $31\frac{1}{2}$ degrees, with a charge of 20 pounds powder at an extreme range of $5\frac{3}{4}$ miles, for which data we hunted in vain through quite a large military library, where we encountered any amount of strategy, but very few statistics. The former one can manufacture for himself, but the latter, like poets, are born, not made.

This paper also contains a valuable discussion of Coast Defense, what is essential and what is accessory, and an exposure of the fallacies still prevalent. The subject is in no danger of being worn threadbare if we give it a little consideration in the very words of Gen. Gillmore.

It is, he says, an error to suppose that a defense by torpedoes, however perfect in itself, can stand alone. The torpedo must be protected from removal by the enemy, and the only efficient protection is shore batteries of heavy guns.

The auxiliary defense by torpedoes should be of such magnitude that no fleet could

attempt to run the gauntlet without imminent risk of destruction. A defense of this potential character is a most powerful conservator of international quiet and good will.

The chief office of permanent fortifications is to avert war. They are the guardians rather than the champions of the public good and of the property of the people.

Equally to the purpose is what follows also from Gen. Gillmore. Destructive energy of the same denomination is neutralized when placed in opposing hands. Fleet arrayed against fleet leaves too much to risk and accident, with our stake on the issue immeasurably greater than the enemy's.

We must depend mainly upon those agencies exclusively our own, which cannot be neutralized or duplicated by our antagonist, and will therefore always keep him at a disadvantage, *i. e.*, permanent shore batteries and their attendant channel torpedoes. All naval power possessing seagoing qualities may be neutralized entirely.

Perhaps as interesting a paper as any of the 4th volume is the account of the surrender at Appomattox C. H. by Gen. Porter, in which the details of that great event are given with a fullness that shows how sharply they were impressed upon the memory of an observer not unconscious of his fortune in being present at one of those scenes upon which poets, orators, and painters delight to dwell and into which is gathered so much of past struggle and future promise; both promise and struggle, however, as with all things of Divine shaping, made to reveal their real nature slowly as the years go by and prove them to be far other than the passions of men either dreaded or prayed for.

The interview between Gen. Grant and Gen. Lee took place in the house of Mr. McLean, whose former home was near the battle-ground of the first Bull Run and used for a time as headquarters by Gen. Beauregard.

Certainly, as Gen. Porter says, it was a curious coincidence that the first and last events of the War were enacted upon the lands of one and the same man who, by the change, had hoped to escape from the reach of the contending armies.

But time fails us. There is hardly a leaf in these four volumes that does not furnish something to arrest and fix the attention. They have their attractions where simply the adornment of the shelf is in question, but to a man whose library originates in his needs and so becomes a growth instead of an accumulation, the *Century War Papers* fulfill the definition of a perfect book as one the contents of which shall serve to detain the idle and satisfy the scholar.

The reader who desires to enter into the vexed questions of responsibility for failure and credit for success that arise out of the operations of war, where the efforts of the many and the faults of a few contribute so materially and yet in such blended proportions that the right of ownership in the result is as difficult of determination as that of the farms superimposed by a landslip, will find each side impartially presented, and can exercise his ingenuity in balancing facts and inferences until he has constructed some little cosmos of his own, but even with all that is before us one cannot help thinking of that larger part that has not been told and of how much of this now never will be.

It lies voiceless in the graves of Lee and Jackson, Lincoln and Thomas, while scribes, envious and anxious, stumble and peep over their tombs and labor with puny interpretations of the great mystery to which when living they had little access, and only afterwards approach with still less reverence.

H. W. C.

"Notes" and "Memoirs."

It is, proverbially, unprofitable to kick a dead lion. The act is apt to provoke comparisons at the expense of the kicker, and the plea that it is done in defense of other dead lions seldom avails in the world's judgment.

In a pamphlet* of 77 pages, Col. Carswell McClellan endeavors to dim the lustre of Sheridan's military reputation by accusing him of insubordinate and disloyal conduct toward the late General Meade, and arbitrary and illegal action in the case of the late General Warren. In attempting to sustain his charges, Colonel McClellan makes copious citation from General Sheridan's "Memoirs," and the official records, including the Report of the Warren Court of Inquiry. A few remarks, only, upon the salient points of this pamphlet are possible here.

Its author opens with an eulogistic paragraph upon the Cavalry Corps of the Army of the Potomac, although he also, somewhat inconsistently, remarks "that Corps needs no Eulogy here." General Sheridan's statement† as to the condition of the Corps when he joined it in 1864, the excessive picket duty required of it, the superior wisdom of the enemy in husbanding his cavalry during the winter, etc., are quoted as evidence of that commander's intention "to spurn the record of the men who * * led by Generals Buford and Gregg, under the command of General Pleasanton, through the long hours of June 9th, 1863, crossed sabres with the Cavalry Corps of the Army of Northern Virginia." It may be news to Colonel McClellan that, before General Sheridan's advent upon Virginian soil, the points just recited had been officially represented by the cavalry leaders mentioned, and were the subject of daily complaint by subordinate commanders, of whom the undersigned was one. It is no reflection upon General Hooker, the creator of the Corps, nor upon General Stoneman, the first to command it, to say as General Sheridan did, that when he was assigned to command the cavalry of the Army of the Potomac, by reason of the custom of unduly subordinating its operations to the movements of the main army, that *in name only* was it a corps at all. A cloud of witnesses may be found to verify this fact.

Nor was it impertinent nor insubordinate, under the letter and spirit of his assignment by the Lieutenant-General present with the Army, and directing its operations in person, for General Sheridan to express to General Meade his views as to the proper use of cavalry in the field; views which, in spite of inflexible tradition, have recently been adopted by the leading military Powers of Europe. The sooner it is admitted that, while *nominally* "commanding the Army of the Potomac," General Meade, upon the arrival of Lieut.-Gen. Grant at its headquarters, became simply Chief of Staff, the easier it will be to deal justly with General Sheridan's words and deeds as the Chief of Cavalry. General Grant desired more cohesion and independence in his mounted force, and selected Sheridan, of the soldiers best known to him, to carry out his purpose; and one ardent Buford admirer, who then saw no necessity for *importing* a corps commander, will always testify to the wisdom of General Grant's choice.

No ingenious distortion nor sinister interpretation‡ of the language used by Sheridan, in his reports and memoirs, can ever make him anything but a subordinate and loyal, if, sometimes, an impetuous soldier. That Colonel McClellan finds it necessary to arraign the Lieutenant-General, the superior commander of both Meade and Sheridan, for his approval of the latter's course, denotes weakness on the part of the accuser.

The other part of the pamphlet is devoted to a rather involved description of the operations immediately connected with General Warren's summary removal from the command of his Corps at Five Forks. The findings and opinions of the Court of Inquiry (absolutely free, as they are, from censure of General Sheridan) are interwoven with the author's comments and deductions. He claims that General Sheridan acted illegally in relieving General Warren, and ungenerously in not exerting himself to

*Notes on the Personal Memoirs of P. H. Sheridan. By Carswell McClellan, Bt. Lieut.-Col. U. S. V. St. Paul, 1889.

†"Memoirs," p. 352, vol. 1.

‡See "Notes on the Personal Memoirs," etc., pp. 4, 20, 24.

exonerate that officer after the War. General Grant, also, comes in for a share of animadversion on the same account. It seems to survivors who cherish the memories of those great soldiers, that no good can come from thus reviewing the misfortunes of any. The friends of General Warren will always hold that he was unjustly treated; cold, impartial, professional opinion will, nevertheless, be formed upon the official testimony as sifted by the Court of Inquiry, and neither "Memoirs" nor "Notes," written a quarter of a century after the event, will be preferred for that purpose. Warren's figure, erect upon the "Round Top," will stand out, distinctly, in the sunshine of memory long after the forest trees of Five Forks have ceased to cast a shadow. General Meade, were he alive, would be the first to deprecate this latest *post bellum* examination of the joints in his contemporaries' armor.

Surely, the time has come when the War for the Union should be discussed in an impersonal light, upon its professional merits only, and for the benefit of the soldiers of the near future. To them the personal controversies of the Army of the Potomac will possess no greater value than those of the Army of the Revolution.

T. F. R.

The Boy Spy.*

The War for the Union, 1861-65, is remarkable, above all human conflicts, for the number of pens that have sought to preserve its history. Realizing, as it seems, that the materials—the bricks and the mortar—must be gathered together, before the Master Builder can begin his work upon the great historical edifice, each soldier has brought forward his "own story" of skirmish, or battle, or campaign, and in imagination lays it at the feet of the coming Homer who shall immortalize American valor. One of the latest and not the least in importance of these literary bricks is "The Boy Spy,"—a title hardly worthy of the valuable information contained between its smart blue-and-gold covers. For it is not simply a juvenile work, nor does it consist of the lurid trash too often, under similar caption, unloaded upon an indiscriminating community. Between its lines—descriptive of the author's personal experience, first as a wild youth rushing into the enemy's country from pure love of excitement, and afterward taking his life in his hands as an experienced scout and soldier—may be read the shaping of the policy of a great Government; the slow awakening of a great people to the public danger; the rude methods at first resorted to in organizing masses of armed men, and the intrigues attending the appointment of their leaders; glimpses of the personality of Presidents, Cabinet Ministers, Commanding Generals, Flag Officers and Legislators, in moments of perplexity or triumph, as words fell from their lips in the confidential atmosphere of the telegraph office, or under the strong excitement of the battle-field. Commencing his adventurous career with the first mutterings of the storm in 1861, and with the aim of winning his spurs by some deed of daring and special service to the Government, we find "the Boy" at New Orleans watching the growth of the Secession flame, slipping through the lines in front of Fort Pickens with important information for the garrison, detained on board a United States war-vessel as a suspicious character, but eventually sent north as a friend to the Union; imprisoned in the Old Capitol prison, from which he escaped and enlisted in the Regular Cavalry, taking part in the Stoneman Raid of 1863; detailed on "special service" at Burnside's headquarters; at Gettysburg; in Tennessee; mingling with leading Confederates at Richmond and, anon, with Senators at Washington; unconsciously treading the tortuous, dangerous path of André and Nathan Hale, with the possibility of a long rope and a short shrift at the end.

In the "action" of this true tale the reader is reminded, now of Defoe, then of Verne and again of Charlie King, although it lacks the literary smoothness of those

**The Boy Spy*. By Major J. O. Kerbey, Washington, 1889.

writers. The author writes as he acted in war times—quickly and intuitively—and without much attention to grace of diction : as he expresses it, he “fires low to hit the masses” and he “calls a spade, a spade.” Through the coarse web of privation, wounds and war, runs the silken thread of the tender passion, giving the story the touch of romance so often omitted when our battles are fought o’er again in our dignified, grandsire, moments. Many full-page wood-cuts embellish the work.

Besides its historical data this book contains interesting biographical material, especially regarding Abraham Lincoln, Jefferson Davis, Andrew Johnson, Simon Cameron, Edwin M. Stanton, John Covode, “Ben” Wade, “Parson” Brownlow, Generals Hancock, Howard, Fitz John Porter, Doubleday, Burnside, Admiral Porter, *et al.* It deserves (what it is said to be getting) wide circulation. It is “sold by subscription,” but the author states that he will mail a copy, to any one, on receipt of price, \$2.

R.

Military Expositions.

There is nothing so impressive nor so potent an educator as an object lesson. For the purpose of reaching the hearts and understandings of the masses and imparting, in one day, a great variety of information concerning the Art and Science of War, a modern Military Exhibition is to be commended. Since the Philadelphia Centennial of 1876, such an annex has formed a popular part of every World’s Fair, and very recently, at Edinburgh, a “Military and Naval Exhibition,” held under the auspices of some of the most distinguished soldiers and sailors of Great Britain, has proved such a success that one upon a grander scale is soon to follow in London.

A neat publication from the Government printing-office, just at hand, records the interesting exhibit of the War Department at the Cincinnati Exposition of 1888-89 ; the collection of relics, trophies and modern weapons, and the admirable catalogue, in which each object is described, reflects the highest credit upon Capt. A. H. Russell, Ordnance Department, the officer in charge. The industry, tact, and general military information required of an officer assigned to such duty makes the detail anything but a “soft thing ;” it is, however, a duty of great importance, bringing into closer relations the Army and the People.

T.

Vireun School Methods.

Nineteen years ago Major H. C. Symonds opened the Vireun school at Sing Sing, N. Y. Here he proposed to prepare candidates for admission to the United States Military Academy.

From all parts of the country, and from schools in Europe, pupils have come during these years, and the experience gained in their instruction has been embodied in the text-books which Major Symonds now offers to the public. Twenty years ago the examinations at the Military Academy were exceedingly simple, but the standard for admission has steadily advanced, from year to year, until it now calls for a knowledge which can rarely be acquired by the youth of average capacity, except in a thoroughly high school course of study. From the best text-books a process of sifting out, abstracting, or making a digest of those parts that from experience seemed of highest importance, was then begun.

These extracts have gradually assumed the shape in which they now appear, and we predict for them all the success which Major Symonds’ experience would lead us to expect.

B.

FOR REVIEW.

- The Boy Spy.* A substantially true record of events during the War of the Rebellion. By Major J. O. Kerbey. Washington, 1889.
- Torpedoes and Torpedo Warfare.* By C. Sleeman, Esq., late Lieut. R. N. and late Commander Imperial Ottoman Navy. Second Edition. Portsmouth: Griffin & Co., 1889.
- Notes on the Personal Memoirs of P. H. Sheridan.* By Carswell McClellan, Bvt. Lieut.-Col., U. S. Vols. St. Paul, 1889.
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OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Revista Cientifico Militar. (September, 1889)

BELGIUM.

La Belgique Militaire. Manœuvres of 1889. Belgium: The Question of Guns. Distribution of the Militia Contingents. The Manœuvres of the 2d Lancers. Electric Lighting in War. Maxim Guns again. The New Rifles. The Nation in Arms. Adoption of the Repeating Rifle. The Manœuvres of 1889. Rule Concerning the Interior Economy of the Infantry. Belgian Neutrality. The Question of Guns.

ENGLAND.

Proceedings of the Royal Artillery Institution. (September, 1889) Mounted Artillery with the Hazara Field Force, N. W. Frontier of India. Internal Ballistics. Defense Scheme for the Military English Forces. Simple-Position Finding. Notes for Lecture on Jointed Guns. The 12-pdr. Shrapnel and its Defects. The Attack and Defense of Entrenched Camps. (October) The Manufacture of Cast Steel Projectiles. Notes on the Dutch Field Artillery.

Journal of the Royal United Service Institution. (Vol. 33, No. 150) The Tactics of Coast Defense. The Mariner's Compass in Modern Vessels of War. The Mechanical Coaling of Steamers. The Pneumatic Torpedo Gun; its Uses Ashore and Afloat. The Photographing of Artillery Projectiles travelling through the Air at a high Velocity. The Drill Regulations of the German Field Artillery.

Colburn's United Service Magazine. (October, 1889) The Naval Manœuvres. Early Developments of Naval War. Military Jottings.

The Illustrated Naval and Military Magazine. (October, 1889) Naval Warfare, IV. The Veteran. Autumn Manœuvres. The Royal Naval School. Notes on Military Topography. The Canadian Campaign of Montgomery and Arnold. Naval Manœuvres. (November) The Battle of Eckernförde. Oriental Arms and Armor. Naval Warfare, V. Torpedo Boats in Germany. Artillery at the Paris Exhibition. Soldiers' Homes and Institutes. The Spanish Submarine Vessel *El Peral*.

Aldershot Military Society Papers.

Army and Navy Gazette. (To date)

United Services Gazette. (To date)

INDIA.

Journal of the United Service Institution of India. (Vol. 18, No. 77) The Organizations of European and Eurasian Subjects in India (including Volunteers) not belonging to the Army and Navy.

ITALY.

Rivista di Artiglieria e Genio. (September, 1889)

NEW SOUTH WALES.

United Service Institution Publications. The Defense of the North-Western Provinces of India. Modern Infantry Fire. Coast Defense by Breech-loading Guns on Hydro-Pneumatic Carriages.

SPAIN.

Memorial de Artilleria. (September and October, 1889) Firing Regulations of the German Field Artillery. Notes on Explosives. Memoir on the System of Artillery Instruction. Provisional Table of Fire for the B. L. Mortar, 15c.

UNITED STATES.

The Century. (November, 1889) The Autobiography of Joseph Jefferson, I. A Connecticut Yankee in King Arthur's Court. Lincoln: The Second Inaugural; Five Forks, Appomattox. Southern Cadets in Action. Who ever saw a Dead Cavalryman? Shooting into Libby Prison. A Denial. Governor Seymour during the Draft Riots. (December) Selections from Wellington's Letters. The Autobiography of Joseph Jefferson, II. Captain Joe. Lincoln: The Fall of the Rebel Capitol; Lincoln in Richmond.

Scribner's Magazine. (November, 1889) Where Emin is. The effect on American Commerce of an Anglo-Continental War. Electricity in Relation to the Human Body. A New Field of Honor.

The United Service. (November, 1889) Soldier or Granger? The United States Revenue Cutter Service. An Incident of Fredericksburg. The Mobilization of the Fleet. The English Naval Manœuvres. Some Military Reminiscences of the Rebellion. (December) The Evolution of the Torpedo Boat. One View of the Army Question. The United States Revenue Cutter Service. The Annual Inspection of the National Guard by Army Officers. A Remarkable Episode of the late War.

St. Nicholas. (November, 1889) The Child and the Pyramid. A Story of a Horse. The Prince and the Brewer's Son. (December.) Buffalo Hunting. How the Emperor goes.

Harper's New Monthly Magazine. (November, 1889) The Mexican Army. The Republic of Columbia. (December) The Taking of Captain Ball. Modern Russian Art.

The Popular Science Monthly. (November, 1889) The Art of Cooking. Israelite and Indian Responsibility in Mental Disease. The Lucayan Indians. (December) New Phases in the Chinese Problem. Governmental Aid to Injustice. The Royal Society of England.

- The North American Review.* (November, 1889) Our National Conceits. Are Telegraph Rates too High? The New Instrument of Execution. An English View of the Civil War. The Dangers of Electric Lighting. (December) An English View of the Civil War. Lord Wolseley Answered. The Question of Divorce. Republican Tactics in the House. The Incapacity of Business Women.
- Magazine of American History.* (November, 1889) A Chapter from the History of Utah. Thrilling story of a British Surgeon's Experience in the Revolution. Some of the Beginnings of Delaware. Oliver Pollock; His connection with the conquest of Illinois, 1778. (December) Lincoln's Restoration Policy for Virginia. General Grant and the French.
- Transactions of the Technical Society of the Pacific Coast.* (April, 1889) Falb's Theory of Earthquakes. The Element of Labor in Engineering Estimates.
- The Railroad and Engineering Journal.* (November, 1889) Engineering in Naval Warfare. The Thames River Bridge. Ship Building on the Pacific Coast. A New Chilian Battle-ship. The Development of Armor. Naval Progress of the United States. French Criticism on our New War-ships. (December) Experimental Aid in Designing Steamships. An English View of our Navy. United States Naval Progress.
- The Pennsylvania Magazine of History and Biography.* (October, 1889) The first printed Protest against Slavery in the United States. A Narrative of the Transactions, Imprisonment, and Sufferings of John Connolly, an American Loyalist and Lieut.-Col. in his Majesty's service.
- Transactions of the American Society of Civil Engineers.* (August, 1889) Ship Canals in 1889. The Vicksburg Settling Basins. (September) The Sibley Bridge.
- Bulletin of the American Geographical Society.* (September, 1889) A Look at Algeria and Tunis. The Portuguese in the Track of Columbus.
- Monthly Weather Review.* (To date)
- Publications of the Department of Agriculture.* (To date)
- Science.* (To date)
- The Army and Navy Register.* (To date)
- Johns Hopkins University Publications.* (To date)
- Philadelphia Weekly Times.* (To date)
- The Boston Courier.* (To date)
- The Volunteer.* (To date)
- The National Guardsman.* (To date)
- Home and Country.* (To date)
- Kansas City Times.* (To date)

ACCESSIONS TO THE MEMBERSHIP, 1889.

List of Members who have joined the Institution since January 1st, 1889.

* Life member. ‡ Life member from member. † Associate member.

- †Ammel, C. S., late Capt. 14th Infantry, O. N. G.
- ‡Andrews, George, Lieut. 25th Infantry.
- ‡Andrews, G. L., Col. 25th Infantry.
- Batcheler, J. B., Lieut. 24th Infantry.
- *Bates, J. C., Lieut. Col. 13th Infantry.
- Baylies, James, Lieut. 5th Infantry.
- †Beckwith, L. F., Civil Engineer.
- Blake, E. M., Lieut. 5th Artillery.
- †Brown, Emily, Miss.
- †Bruce, C. E., Surgeon 8th Regiment N. G., S. N. Y.
- Byrne, Charles, Lieut. 6th Infantry.
- Campbell, Archibald, Lieut. 5th Artillery.
- Carter, O. M., Lieut. Engineers.
- Cartwright, G. S., Lieut. 24th Infantry.
- Clarke, C. J. T., Lieut. 10th Infantry.
- †Cochran, W. H., Capt. 13th Regiment N. G., S. N. Y.
- Cotter, John, Lieut. 15th Infantry.
- †Currier, E. E., Col. and A. I. G., M. V. M.
- Curtis, E. S., Lieut. 2d Artillery.
- Davis, G. B., Lieut. 23d Infantry.
- †Dean, C. W., Civil Engineer.
- †DeForest, Ezra, Capt. 23d Infantry, N. G., S. N. Y.
- ‡Derby, G. McC., Capt. Engineers.
- Detchmندی, G. A., Lieut. 6th Infantry.
- Dodge, G. M., late Major-Gen. Volunteers.
- Dorst, J. H. Capt. 4th Cavalry.
- Eastman, F. F., Lieut. 14th Infantry.
- Ellis, W. E., Lieut. 5th Artillery.
- Farnsworth, C. S., Lieut. 25th Infantry.
- Foote, S. M., Lieut. 4th Artillery.
- French, G. E., Lieut. 4th Infantry.
- †Gallup, Albert, Capt. 1st Brigade N. G., S. N. Y.
- Gallup, C. C., Lieut. 5th Artillery.
- ‡Godfrey, E. S., Capt. 7th Cavalry.
- Grebbe, E. St. J., Lieut. 2d Artillery.
- Hammond, A. G., Lieut. 8th Cavalry.
- Hanson, T. G., Lieut. 19th Infantry.
- ‡Haskell, J. T., Capt. 23d Infantry.
- Hasson, P., Capt. 14th Infantry.
- Hathaway, F. H., Capt. Q. M. Dept.
- †Henry, N. H., Surgeon 12th Regiment N. G., S. N. Y.
- †Huidekoper, R. S., Brigade Surgeon N. G., Pa.
- †Jacobs, J. E., Brevet Col. U. S. V.

- Jervey, Henry, Lieut. Engineers.
Jordan, S. S., Lieut. 5th Artillery.
Judson, W. V., Lieut. Engineers.
Kerr, J. T., Lieut. 17th Infantry.
Kline, Jacob, Major 24th Infantry.
Krause, William, Capt. 3d Infantry.
Lott, G. G., Capt. 11th Infantry.
Lovering, L. A., Lieut. 4th Infantry.
Martin, W. F., Lieut. 25th Infantry.
Massey, S. F., Lieut. 5th Artillery.
†Morle, R. P., Major 13th Regiment N. G., S. N. Y.
Muhlenburg, J. C., Major Pay Dept.
Murray, Arthur, Lieut. 1st Artillery (A. J. A.).
Neary, W. C., Lieut. 3d Infantry.
†Ordway, Albert, (late Col. 24th Mass. Infantry) Brig-Gen. D. C. M.
†Peck, Charles, 7th Regiment N. G., S. N. Y.
†Pierce, H. T., (late U. S. V.) Physician.
Philbrick, J. H., Lieut. 11th Infantry.
†Plume, J. W., Major-Gen. N. J. N. G.
Porter, F. J., Colonel, Retired.
Potter, C. L., Lieut. Engineers.
Price, David, Lieut. 1st Artillery.
†Raymond, C. H., Late Lieut. 177th N. Y. Volunteers.
Reade, Philip, Lieut. 3d Infantry.
Reichmann, Carl, Lieut. 24th Infantry.
Reynolds, W. B., Lieut. 14th Infantry.
†Rhineland, T. J. O., 7th Regiment N. G., S. N. Y.
Rogers, R. M., Lieut. 2d Artillery.
†Rowan, Hamilton, Lieut. 2d Artillery.
Shunk, W. A., Lieut. 8th Cavalry.
Smiley, S. E., Lieut. 8th Infantry.
Smoke, S. A., Lieut. 18th Infantry.
†Sternberger, Julian, Lieut. 12th Regiment N. G., S. N. Y.
Straub, O. J., Lieut. 1st Artillery.
Strong, Norton, Capt. Med. Dept.
Swigert, S. M., Capt. 2d Cavalry.
Tilton, H. R., Major Med. Dept.
†Townsend, C. H., Major and A. A. G., N. G. Pa.
Treat, C. G., Lieut. 5th Artillery., A. D. C.
Tyson, L. D., Lieut. 9th Infantry.
Wagner, Henry, Capt. 1st Cavalry.
†Wetherill, Lawrence, Major and I. G., N. G. Pa.
Wheeler, C. B., Lieut. 5th Artillery.
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THE DEVELOPMENT OF SUBMARINE MINES AND
TORPEDOES.*

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THE Civil War, 1861-65, demonstrated upon a grand scale the important part which the modern torpedo can be made to play in maritime warfare.

Prior to this period its effectiveness had never been proved in actual war.

Bushnell in 1776-78, Fulton in 1801-7 and Colt in 1830-44 had shown by practical experiments the destructive effect of subaqueous explosions of gunpowder and had urged the adoption of the torpedo as an important weapon for destroying hostile vessels, but neither in this country nor in Europe did the subject receive the attention it deserved. The ideas which the Confederates put into practical form during 1861-65 were simply an elaboration of those of Bushnell and Fulton, to which was added an electrical system almost identical with—certainly not an improvement upon, that proposed by Colonel Colt.

* As now generally understood, the word *torpedo* applies to cases constructed to carry an explosive agent to a distance, having within themselves their motive power and capable of firing their charges under water on contact.

Bushnell was the first to perceive and experimentally establish that the pressure of water alone may develop an intensity of action in sub-aqueous explosion sufficient to destroy a vessel in the vicinity. It was he who gave the name "torpedo" to a case containing a charge of gunpowder to be fired under water. He introduced the use of submarine boats, and of drifting torpedoes both coupled to a line and floating freely with the tide.

To Fulton is undoubtedly due the credit of originating the use of what are now known as submarine mines or torpedoes anchored to obstruct a channel. Fulton simply improved upon and developed Bushnell's *offensive* machines, but he *originated* the method of operating now known as *defensive* torpedo warfare.

The term is qualified for descriptive purposes and includes controlled or locomotive torpedoes, which like the other carry their own motive power, but are under the control of an operator, who, at a fixed station directs their flight and may fire the charge by means of electricity. Other "qualified" torpedoes are of the towing, drifting and spar class. Submarine mines include all cases containing an explosive agent which are retained in a certain position either by their own weight (ground mines) or by moorings (buoyant mines).

They are also divided into two general classes, controlled and self-acting.

Those of the controlled class have other designations depending on the mode of firing, as "observation" mines (fired entirely by some method of observation or judgment), electro-contact (fired by "contact") and combination-contact (fired both by contact and observation).

The English propose a combination-buoyant mine having the circuit closer in a separate buoyant case and connected electrically to the fuse in the mine.

Self-acting mines are divided into electrical (fired generally by a battery within the mine case) and mechanical (fired by mechanical means through the medium of weights, hammers, or by direct percussion, or by chemical fuses protruding on the outside of the case).

There are three methods by which controlled mines are fired.

1. By contact. { a. Automatically.
 b. At will.

2. At will.

3. By observation.

(a) By this method a controlled mine becomes for the time a self-acting one through the medium of the circuit closer.

(b) In this case the actual firing is placed at the will of the operator. The "contact" causes a bell to ring, thus indicating the particular mine or group struck.

"At will" firing is a mode whereby the mine or group may be exploded at the will of the operator whether circuit closers be provided or not and without contact being made.

Observation or judgment firing is usually confined in most systems to simple observation ground mines, though it may be applied, but with far less accuracy, to buoyant mines as well; such a mode requires, of course, some method of cross-bearings or other system of position-finding by which the actual moment when the hostile ship is over or sufficiently near a mine may be determined.

As finally presented his system included four classes of torpedoes.

1. Buoyant mines to be exploded mechanically by contact (stationary type).

2. Line torpedoes designed to be set adrift and fouled by the cables of the hostile fleet at anchor.

3. Harpoon torpedoes to be discharged from a gun and fired by clockwork.

4. Blockship torpedoes to be carried on booms projecting from vessels of a peculiar type and exploded by contact.

Colt worked out a system of buoyant submarine mines to be planted quincuncially in the threatened channels and operated by electricity. By introducing this agent for igniting the charges, he rendered it possible to perfect both classes of torpedoes, movable and stationary. To convey the current he devised one of the first submarine cables ever attempted. Each cable included two separate conductors which, entering the mine, were united by a fine platinum wire imbedded in gunpowder. One set of conductors from all the cables were united and permanently attached to one pole of a powerful battery. The others led to a map of the channel, each one being secured at the point corresponding to the known position of its mine. A reflector threw the image of the hostile ship upon this map, and as the image passed over a wire terminal the operator with the other battery wire closed the proper circuit. By this means he could permit the passage of a friendly vessel or prevent that of a hostile one.

Similar ideas found application in the Schleswig-Holstein War (1848-50), the only difference being that Prof. Himley made use of the earth as a return circuit and dipping batteries to cause the explosion at the proper moment, determined by two observers communicating by pistol shots.

The Anglo-French war with Russia (1855) produced the Jacobi fuse*; also the improvement of placing the igniting apparatus within the torpedo, independent of external levers; and showed that the charge (ten pounds of gunpowder) was far too small even against the wooden hulls of those days.

The Austrians in 1859 adopted a plan very similar to that of Colt, a return circuit being obtained through water and earth. A

* The Jacobi fuse or igniting apparatus consisted of a glass vessel containing sulphuric acid. On the glass being broken by shock the acid flowed over a quantity of chlorate of potash, causing the explosion of the gunpowder.

charge of 400 lbs. gun-cotton, floated twelve feet below the surface, displaced the gunpowder in Colt's plan.

The torpedoes employed by the Confederates may be grouped in five classes: stationary torpedoes; automatic drifting torpedoes; infernal machines; offensive spar torpedoes; and submarine boats.

With the exception of electrical mines, stationary torpedoes consisted of contact mines fired mechanically, the percussive ones having the Rains* or Jacobi fuses.

The electrical torpedos differed from those of Colt in being judgment ground mines, range stakes, instead of a reflector, being used to determine when a vessel was within destructive range.

A low tension fulminate of mercury or the Abel fuse, with Wheatstone's exploder or Grove and Bunsen's cells, constituted the firing agents through the medium of single core gutta-percha cables. Their mine cases included almost every imaginable form and material, but toward the last they employed regularly constructed cylindrical or pear-shaped riveted ones of boiler iron. The charges were often unnecessarily large, little being known of the laws by which their dimensions are now regulated.

Defective mooring sometimes occasioned accidents from their own mines. No systematic endeavor seems to have been made to protect lines of stationary torpedoes in harbors by flanking guns, much being left to the chance of their not being discovered.

A cigar shaped boat of boiler iron, carrying a spar-torpedo fired by percussion, constituted this offensive weapon of the Confederates. While on the Union side an ordinary steam launch was fitted with the same torpedo fired mechanically at will.

The engines of both were noisy and gave no greater speed than eight miles an hour. The submarine boat was practically a failure.

The organization of the Confederate Submarine Battery Service, during the War of the Rebellion, was the first instance of an attempt to secure the services of trained officers and men. These were required to perfect themselves in this kind of warfare, to devise and experiment with all weapons pertaining thereto, and finally to use them in the face of an enemy. Mr. M. F. Maury, formerly of the U. S. Navy, the first chief of the Bureau, was

* The Rains fuse had an explosive mixture of 50 per cent. chlorate of potash, 30 per cent. sulphuret of antimony, and 20 per cent. ground glass, and exploded under a pressure of 7 lbs.

superseded by the talented General Rains, formerly of the U. S. Engineers and Artillery. To the latter officer the efficiency of the corps and value of the work accomplished were principally due.

II.

Crude as was the Confederate system, compared with those now in vogue, the effect it produced left little doubt that no nation could, with proper care for its own safety, disregard the torpedo in future wars.

To the weaker nations, especially, did the inauguration of this new and important mode of maritime warfare become of the utmost importance—for its value to them is much greater, proportionately, than to the more powerful ones. Indeed, the torpedo has been described by a well-known Englishman as “the weapon of the feeble,” and undoubtedly it is a great leveller.

By strengthening the hands of the weak it has done, and is doing much to justify the sentiment inscribed by Fulton upon the title page of his first treatise on Torpedo War:—“The Liberty of the Seas will be the Happiness of the Earth.”

Accordingly, soon after 1865, every civilized government became actively engaged in prosecuting investigations—still pursued—for perfecting this weapon. The resulting development is in general the following:

1. The determination of the relative values and destructive effects of explosive mixtures and compounds.
2. Improvement in the shape of the case, mooring arrangements, and manner of connecting the parts.
3. The extension and development of electrical mines, to the abatement, if not exclusion, of mechanical mines. The invention and development of circuit regulators. The improvement of fuses and range finders, and the adaptation of the electric light.
4. Improvement of torpedo boats; spar-torpedoes; and the invention and development of locomotive torpedoes.
5. The development of the submarine boat.
6. Torpedo Artillery (Mefford-Zalinski gun).

Dynamite ($I = 100$, S. G. = 1.6) and gun cotton ($I = 87$, Abbot; $I = 100$, Bucknill; S. G. = 1.06) are the explosives usually adopted, at least for buoyant mines. Their density and great intensity of action—the latter about four times that of gunpowder—renders a less weight and volume capable of perform-

ing a greater amount of work, thus reducing the cost, weight and principal dimensions of the whole system.

The fact that extreme variations of temperature, together with changes from wet to dry, or the reverse, do not materially affect their strength, added to comparative safety in handling and convenience of manipulation formerly rendered their adaptability and consequent value greater than any others. Besides being more dense and powerful than gun-cotton, dynamite seems to possess also the property of not being liable, when in loose powder, to sympathetic explosion, even within the limits of ordinary practice, unless the case be ruptured.

Experiments of late years have been conducted almost entirely with gun-cotton in England and dynamite abroad.

The first dynamite devised by Prof. Nobel, in 1867, was at once followed by other compounds and mixtures in quick succession—to-day Major Cundill enumerates some four hundred in his “Dictionary of Explosives.” Of these, experiment has shown that besides dynamite and gun-cotton, gelatine dynamite, blasting gelatine and forcite gelatine are most suitable for submarine work.

Nobel found that when, in place of tri-nitro cellulose, a lower product of the nitration of gun-cotton, viz., collodion or soluble gun-cotton, was combined with nitro-glycerine, the result had almost the character of a compound.

Thus explosive gelatine, 1881, has a composition of 89 per cent. nitro-glycerine, 7 per cent. collodion, 4 per cent. camphor. The addition of 4 per cent. camphor makes this explosive very insensitive to detonation from shock so long as it remains unfrozen. A rifle bullet at 100 yards range striking a naked slab 3 inches thick and flattening itself on an iron plate against which the slab rests has failed to ignite the explosive. Its intensity of action ($I = 117$) is that given by General Abbot's experiments, 1881.

Blasting Gelatine, 1884, $I = 142$, composition = 92 per cent. nitro-glycerine, 8 per cent. collodion, S. G. = 1.55. Its greater density permits 300 lbs. blasting gelatine to occupy the space necessary for 200 lbs. dynamite, a most important attribute, especially for ground mines.

General Abbot concludes from the 1884 experiments that blasting gelatine without camphor is most admirably suited to submarine mining.

The difficulty of obtaining pure nitro-cotton on which the stability of these gelatines depends is well known.

This leads to forcite in which an attempt has been made to avoid a like difficulty. Forcite, I = 133, S. G. = 1.51, composition = 95 per cent. nitro-glycerine and 5 per cent. cellulose.*

Forcite in many respects resembles Nobel's explosive gelatine. Investigations indicate that it must be classed as one of the explosives worthy of serious consideration when it becomes necessary to defend our coasts with submarine mines. Its great strength is fully established; its permanency for long periods of time remains to be studied. (Abbot.)

Gelatine dynamite, I = 123 (Bucknill), S. G. = 1.55, composition 65 per cent. "A" and 35 per cent. B. A = 97.5 per cent. nitro-glycerine and 2.5 per cent. nitro-cotton. B = 75 per cent. potassium nitrate, 24 per cent. cellulose, 1 per cent. soda.

The makers of the gelatine dynamites claim that they are much more powerful than dynamite, more convenient to handle and more economical, *i. e.*, a greater effect per unit of cost.

A few governments like Spain and France seem still to retain gunpowder for ground mines, under certain circumstances (Bucknill recommends it in emergency), but here also experiment has developed increased power, due to the use of detonating fuses distributed through the mass, producing thereby much more rapid and complete combustion; but as moisture cannot be entirely excluded from a torpedo case, the use of any explosive having a soluble base seems of doubtful expediency.

In conclusion, the efficiency of an explosive for submarine mining depends on its intensity of action per unit of weight and per unit of space occupied.

The determination of the exact destructive limits of these explosives, attained almost entirely within the last few years, proves the very restricted range which they have (100 lbs. dynamite gives 16.3 ft. horizontal, 18.6 ft. vertical†) for overcoming the resistance offered by the hulls of modern ships of war. To produce a fatal shock it is estimated that an instantaneous *mean* pressure of at least 6,500 lbs. to the square inch must be secured—(Abbot). Bucknill claims 12,000 lbs. per sq. inch *maximum* pressure by Major English's rule. The standards of destructive force differ in the two cases and the figures are not properly comparable.

* It is not known that this is purely cellulose.

† 100 lbs. explosive gelatine gives 18.2 feet horizontal and 20.3 feet vertical.

The results, however, in computing actual destructive ranges, correspond within practical limits, as closely as could be expected from independent investigations of so complex a problem.

Thus, for example, the horizontal destructive ranges of 500 lbs. dynamite are—Abbot, 35. feet, Bucknill, 38.2 feet.

The following table from Bucknill gives the relative value of the best explosives:

Order of merit.	Description of explosive.	Specific gravity.	Weight of cubic foot in lbs.	Cost per lb. in pence.	Efficiency under water		Remarks.
					Per pound.	Per cubic foot.	
1	Blasting gelatine...	1.54	96.3	24	142	138	25 per cent. of added water.
2	Forcite gelatine...	1.51	95.4	?	133	127	
3	Gelatine dynamite.	1.55	96.9	21	123	119	
4	Dynamite No. 1...	1.6	100	17	100	100	
5	Gun-cotton dry...	1.06	66	27	100	66	
6	Gun-cotton wet...	1.32	82.5		80	66	
7	Tonite	1.28	80		85	68	
	Gunpowder.....	0.9	56	5	25	14	

III.

The spherical form of case has always been recognized as theoretically the best suited for buoyant mines, but cost and practical difficulties of manufacture have heretofore, elsewhere than in the United States, stood in the way of its adoption.

European cases have, however, the fault of being riveted, with bales attached directly to the case. This riveting induces rust, with consequent deterioration and leakage, increased by the constant vibration to which the torpedo is subjected.

The worst defect results from the "buckling" of the mine case by a neighboring explosion; when this happens the rivets are sure to cause leaks.

Earlier European forms of buoyant case, based on Confederate ones more or less modified, had also the disadvantage of presenting a comparatively great resistance to the action of currents. A buoy of conical form anchored from the vertex, opposes a resistance fully one-fifth greater than one of equal cross-section, having a shape approximately spherical, while the increased relative buoyancy of the latter in respect to its weight yet more augments its advantages. This applies with greater force to cylindrical cases,

and is an important matter in any system, but particularly so in one like that of England, for instance, where the tidal range is from 10 to 20 feet with an average velocity of current exceeding 3 feet per second.

In the United States all known requirements are met by the employment of a spherical steel case, entirely without rivets or bolts.

Wire rope has supplanted other means of mooring, except in emergency, when the electric cable may be used ; and all the parts, size and strength of case, weight and form of anchor, and strength of mooring rope are carefully adjusted to each other and to the conditions they are to meet.

The efficient mooring of submarine mines is one of the most troublesome and difficult functions of this means of defense, difficult not only in the actual work of planting them in the exact positions assigned, but even more so in maintaining them in these positions for long periods of time under the ordinary adverse conditions of strong currents, rise and fall of the tides and rough weather. The questions of "invisibility" and "retention at effective depth" are the ones which give trouble in places where the rise and fall of tide is great (*i. e.*, exceeds twelve feet). Many attempts have been made to overcome this difficulty, but as yet no really practical method has been devised, and in fact, the only way of overcoming it seems to be the crude one of arranging the *mine-lines* so that the mines in one or more of the *lines* shall always be at the right depth at every stage of the tide ; the outer ones being in right position at low water and the inner at high water, so that the latter, though exposed at low water are yet protected by the outer ones, which are then at proper depth and invisible.

Major Ruck, R. E., proposes to obviate the difficulty by a method whereby the mine shall rise and fall automatically with the tide. The anchor is provided with a pulley, and to the mine mooring rope a length of chain, graduated in size and weight, is attached. The chain passes through the pulley and is secured to a counterpoise which consists either of a metal case open at the bottom or closed by a flexible diaphragm, or of a compressible waterproof bag completely closed and properly weighted. As the tide rises, the pressure on the confined air in the counterpoise increases ; its volume and consequently its buoyancy decrease, and the mine rises until the equilibrium is again established.

The lessening pressure of the falling tide produces the opposite effect. It would seem that sea-weed which exists in most harbors, and the twisting of the moorings in tidal changes would cause this plan to fail. We must certainly know what mines are serviceable, and with Major Ruck's mooring this would hardly be possible.

In Bucknill's method of double mooring, intended to accomplish similar results, he plants the anchor with its wire mooring rope up current while the armored electric cable attached to a sinker forms the down current mooring, the mine, of course, being at the apex of the angle thus formed. "By this means observation mines large enough to be effective at all stages of tide can be moored below low water, and smaller mines can thus be moored in currents, where otherwise, their angle of swing would render them ineffective."

Tidal currents do not as a rule confine themselves to a single plane at all stages of the ebb and flood. On the contrary, they swing through widely different angles at different times. But unless the point of juncture of the two branch moorings be acted upon by a force nearly in the plane of the branches, no important reduction in the depression of the mine will result from their spread.

Experience has proved that the use of the electric cable as a mooring for permanent mines intended to remain long in position is hardly admissible. Faults in the insulation are sure to occur before any considerable lapse of time, and these would be difficult to repair in a double system of mooring. The planting of these mines in correct position would be tedious and difficult. Counterminers with their auxiliary sweeps and drags could hardly imagine a better system for their operations.

The class of mines offering the greatest trouble in planting is the combination buoyant mine, as each one consists of an anchor, a mine case and a circuit closer case,—and besides great accuracy of position is essential if they are to be fired by observation. Moreover, the mutual reactions of these two moving bodies under the torsional effects of currents would render the maintenance of this system in proper condition a matter of extreme difficulty.

The best ground mine cases are similar in form to the Confederate "turtle back," increased in weight and strength to meet the new requirements of serving as an anchor, resisting currents, and the shock of neighboring explosions.

The English seem to prefer a cylindrical case which lies on its side.

IV.

A defense like the Confederate, composed almost entirely of mechanical contact mines, dangerous alike to friend and foe, would be unsuitable for a government possessing a fleet. Development of electrical systems became therefore inevitable, for it is only by this means that the action of mines can be controlled and their condition ascertained.

The well-known defects of mechanical mines have in most systems occasioned their suppression even as auxiliaries. Electrical self-acting ones are now constructed so that the planting can be conducted with comparative safety. These contain a small battery so arranged, with or without circuit-closers, as to cause the immediate explosion of the charge if the mine goes adrift. This same class of self-acting mines may sometimes find useful employment in repairing injuries done to a regular system of electrical mines by countermining. To be of much value the passage opened by the enemy must be well marked and buoyed. A few self-acting mines dropped into this passage at night would prove extremely dangerous, and they are very easily handled and rapidly planted. They are also largely employed in closing channels not needed for use in harbors which possess more than one channel of entrance.

The immense advantage which the employment of sea mines may give is well illustrated by the operations of the Russians on the Danube, during the Russo-Turkish War, where these mines afforded protection to the Russian line of communications, their bridges over the Danube; they neutralized the Ottoman fleet of several armored ships and reduced odds which twenty years earlier would have been almost overwhelming.

Had it not been for the moral power of submarine mines the splendid navy of France would hardly have proved so utterly useless to the French in their hour of great need in 1870, and but for this dread of the torpedo and the mine the incapacity of the Turks to make full use of their immense superiority on the Danube and in the Black Sea would not have to be recorded. These Russian torpedoes could be made purely self-acting or "automatic at will" by supplying circuit closers and connecting the wires to a short station.

The advance made in electrical science since 1865 has added immensely to the improvement of torpedo processes. New methods of measurement and determination of electrical condition, the inventions and improvements in submarine cables and instruments of precision, and various mechanical details, have brought into existence greatly increased capabilities.

The rude "tongue-test" of the Confederates has given place to means, more or less complicated in different systems, for determining battery-strength, proper working of apparatus, leaks and injuries in cable and torpedo.

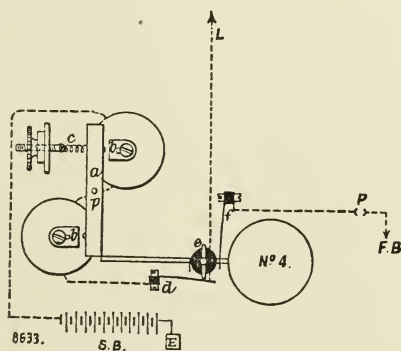
The Smith frictional, Laflin and Rand, Farmer and Gramme machines combine the excellences of this class of generators.

The advantages gained in voltaic firing-batteries, represented by the Leclanché, are, greater portability, convenience, and the quality of not sensibly deteriorating when out of use. The best systems have now three batteries instead of one. 1st. A feeble battery for testing, as this has to be done through the bridge of the fuse. 2d. A battery of the feeble and constant class for signalling any interference or contact with the mine. 3d. A firing-battery, which is only brought into play at the proper moment either by the automatic action of the signal battery or by the hand of the operator, thus combining great constancy and electro-motive force with little loss of power. To cause this action by which the signal battery switches itself out of, and the firing battery into the circuit, is the principal object of most automatic apparatus. In the United States it may be set to report if any of the mines or their cables be tampered with, and if desired, automatically fire flanking guns.

The plan usually pursued consists in placing a small electric current continuously on the mine line: when the circuit-closer in or above the mine is actuated by a passing vessel, this current increases by a decrease of circuit resistance, excites an electro-magnet on shore which moves an armature and a dropping shutter, and thus automatically closes the firing circuit, rings a bell, etc.

The automatic indicator or shutter here shown in elevation is the same in principle as the English service instrument, differing from the latter only in detail. These shutters, together with all the working parts, are attached to a piece of ebonite and arranged in sets of seven, each shutter corresponding to a particular mine and bearing its number. Plugs or switches are provided for dis-

connecting the signalling (S. B.) and firing (F. B.) batteries. An armature (a) pivots on (p) between two horns ($bb.$) of an electro-magnet. The lever of a weighted shutter (No. 4) engages the lower end of the armature so that when this armature is attracted by the electro-magnet the shutter falls and strikes a bell. This occurs when the line resistance is decreased by a contact made at the circuit-closer in one of the mines of the groups connected to line (L). The axis of the shutter is insulated and connected to line (L). The metal cross-bar (e) is normally in contact with the spring (d) which is connected, through the coils of the electro-magnet, with the signalling battery (S. B.). As soon as the shutter falls this spring (d) is automatically disconnected and the firing battery (F. B.) brought into play through the spring (f) and contact plate (e), provided the



plug (P) is in place. Should this plug, however, not be inserted the mine remains unexploded, the bell merely showing the fact of its having been struck.

The dielectric is changed to rubber and is protected with iron wire, which adding to the weight causes the cable to sink in the mud, making grappling much more difficult.

The high degree of permanency and uniformity of the fulminate of mercury platinum-wire fuse has caused its retention; better adjustment of parts, length and diameter of bridge, and more secure means of clamping the wires to the plug, are the main changes.

Where the signal battery acts in the manner above described, some precaution must be taken to insulate the end of a cable belonging to a fired mine, or the leakage would cause the auto-

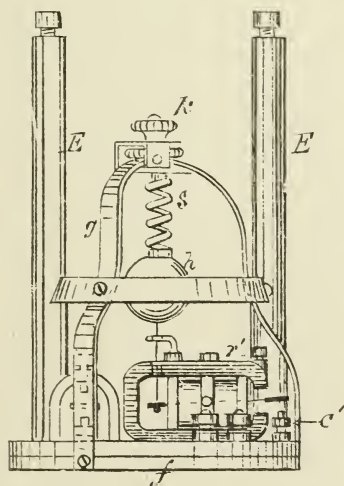
matic apparatus to act undesirably; this is accomplished by attaching at a break in the cable, a cut-off or modified fuse, so arranged in a water-tight case as to explode simultaneously with the mine and insulate the cable ends.

France retains a single-core cable extending to each mine, thinking thereby to avoid the danger of having an entire group cut out by the enemy. Others, however, have followed the English in the use of a seven conductor main cable which branches at a junction-box, into seven single-core ones proceeding to the mines. Most governments terminate each of these cables with a single mine. General Abbot has worked out a system of buoyant mines in which three cables extend from a second set of junction-boxes containing cut-offs, each box being connected to the principal junction-box by the usual single-core cables. Each of the three cables is terminated by a mine thus forming a "grand group" of twenty-one. Each one can be fired automatically singly, or each group of three all together at will; thus insuring greater certainty in judgment firing besides effecting a reduction in the number of parts, increased simplicity and less cost of cable. The efficiency of the whole system is increased by this mode of planting, and the use of the enormous charges, favored in France, and in other countries, avoided.

"For many reasons it appears desirable to cut the field to be mined by continuous lines with ample intervals between mines to prevent them from becoming mutually destructive when fired, and to fill the gaps between lines by single-cable mines admitting only of automatic action. Upon this system it is possible to thoroughly obstruct a large area of channel without increasing to an extravagant extent the total number of individual mines" (Abbot). "Mines which can be exploded only by judgment, at the will of an operator on shore, have a very limited application. At night, or in a fog or the smoke of a bombardment, or when several vessels are approaching abreast, or when the water is deep or the channel wide, the chances of failure are very great. Indeed, the destructive range of practicable charges is so limited that judgment-firing has become nearly obsolete for any but very narrow channels if the ship be constructed with double cellular bottom and water-proof compartments." This applies with greatest force to buoyant mines owing to their large angle of swing and consequent depression under the action-currents, and a ship might pass over the lines were it not for the

invention of an instrument called, according to its mode of action, a circuit-closer or breaker. These are of various forms, all having the same object—to report the contact of a vessel with any mine and fire it if desired. With ground-mines the circuit-closer, when used, is in a separate buoy and anchored either over or in the rear of the mine.

The Chatham (English) circuit-closer consists of a cylindrical envelope inclosing the circuit-closer instrument, the fuses and priming-charge. The circuit-closer instrument, occupying the lower portion of this cylinder, consists of an insulating base (*f*) supporting a tripod frame, from the apex of which is suspended an inertia ball by means of a spiral spring. On the base (*f*) are fixed two



Armstrong relays *r*, *r'*, placed at right angles to one another. Each relay consists of a horseshoe magnet within the inclosed space of which is placed a hollow bobbin of wire. The plane of the horseshoe is vertical. Extending through the bobbin and pivoted on the shorter axis is an armature or tongue. For the relay (*r*) this tongue has an upper and lower contact point, while that for (*r'*) has only a lower contact at the outer end. The relay (*r*) is wound with wire of 2,000 ohms resistance while (*r'*) has but five ohms. The inner end of the tongue of relay (*r'*) is attached, by a piece of silk thread, to the inertia ball, so that in the event of the oscillation of the ball, caused by striking the mine, the inner end of the tongue is pulled up, forcing the outer end down upon the contact point, thus closing that circuit.

The mode of connecting up the circuits differs, for *contact* and *at will* firing and is one of the so-called "secrets."

The principal object of the relay is for testing. By the use of positive or negative currents the armatures are attracted towards different contact points.

The instrument seems too delicate for the rough usage to which it must be subjected in submarine mining.

One other mine system requiring special arrangements has for its object to obstruct a restricted area available for occupation in conducting a bombardment from a distance. This is especially easy to do if the water be sufficiently shallow to permit the use of ground-mines.

"A few large and carefully located charges arranged preferably for judgment firing (so that their discovery by sweeping shall be made as difficult as possible) will reinforce mortar firing in a very effective manner.

"The system permits the use of cables too much deteriorated for automatic firing, and may have an extended application under certain contingencies."

Main lines of mines should be so arranged as to be swept throughout their length by the fire of flanking-guns. These guns, charged according to the range, should be trained by daylight to sweep their respective fields. They are so connected with the electrical system that any injuries to mines or cables at once draws the fire of guns laid to cover the injured point.

"The fundamental principles of defense involved in the employment of sea mines are more intimately connected with fortification than most people suppose. The position of the forts and batteries, of the mines and cables, of the electric lights, of the firing and observing stations, of the telegraphic and visual signalling, forts, etc., should form one harmonious whole."

"As no two harbors are alike, so no two arrangements of fortifications or of mine defense will be the same; but the same principles apply to all, and they do not differ greatly from the broad ideas that should underlie the preparation of every defensive position. But mining differs from fortification in one important particular. The value of sea-mining is greatly enhanced when the positions, or even the approximate positions, of the mines are unknown to a foe. Secrecy is therefore essential. Not concealment as to the efficiency of the apparatus employed, or the manner of its employment; but secrecy as to the waters

that are mined. Any artifice which ingenuity can suggest should be undertaken in order to deceive a foe on this score. Buoys should be laid, which are otherwise useless; bogus mining operations should be ostentatiously conducted for the benefit of spies when time and opportunity are available; false reports concerning the mine-fields should be spread; and some of the mines, especially those in advanced positions, may advantageously be laid at night if possible. When drawing up a design, the object of a foe, and the probable manner in which an attempt would be made to attain it, should be carefully considered. This object may be the destruction of a dock-yard or of a fleet at an anchorage. It may be the reduction of a sea-fortress, or the capture of a commercial city or of a coaling station. The attack may consist in a bombardment, or in forcing a channel at speed, or in ascending a river deliberately by '*force majeure*,' including perhaps land forces, as in the American War of Secession—and the defense in each case must be planned accordingly."

"A fortified dock-yard is not likely to be attacked by land by regular siege made for capture, unless as part of an invasion on a large scale; but a bombardment from land batteries, or from vessels up to perhaps 12,000 yards range, should be guarded against. However, neither ships nor land batteries can effectively bombard an unseen object even at much shorter ranges than 12,000 yards. Consequently, when hills screen a dock-yard from view, no position beyond them need be occupied. On the other hand, when ground exists within bombarding range and in sight of the dock-yard, measures should be taken to deny it to a foe."

General Lefroy once said that "when a fleet bombards, the opinion of naval authorities seems to be that the attacking vessels should anchor; if not, and they continue in motion, their distance from the object is constantly varying, much of their fire is thrown away, and they incur numerous nautical dangers," which now certainly include sea mines. But the operation of bombardment is a long one, lasting for many hours, during which the ships engaged in it would, if anchored, be more exposed both to the artillery and the torpedoes (locomotive) of the defense, than if the ships were kept in motion.

"Guns cannot be considered efficient against ironclads except at ranges of 3,000 yards and under. The forts should therefore be placed some 8,000 or 9,000 yards in front of the object to be

protected from bombardment. If this can be done bombardment is practically prevented, for the most powerful vessels would be much injured by modern rifled guns at battering ranges, and such injuries would necessitate protracted repairs after any conflict with forts, and it is highly improbable that a naval power would risk this loss of efficiency in a fleet at a critical time even for a short period, in order to bombard a dock-yard at long range. Sometimes, however, it is impossible to place forts so far to the front, and in such a case a zone of water will exist from which a fleet may bombard and yet be outside the effective battering range of the guns mounted in the forts. Under such conditions groups of large sea mines to be fired by observation should be scattered irregularly in this zone."

The protection of large commercial shipping centres is not difficult if they be situated up an inlet or river not easy to navigate at the best of times—New York affords an example.

"The position of the mine-fields in such a case should in general be retired from the open sea, both because they would then be more difficult to approach, and because the shelter would enable the miner to carry out the mooring operations in rough weather. Care, must, however, be taken to moor some of the mines at or a little beyond the limits of bombarding range, and the remainder should be scattered in groups or fields as irregularly as may be compatible with their protection by light artillery, and especially quick-firing guns mounted in proper emplacements."

"Absolute mine blocks, which are so fashionable, with their floating impediments telling a foe where the mines are laid, should be avoided. The method places too many eggs in one basket, and shows the position of the basket. A mine defense should be deep and narrow in plan, rather than wide and shallow; and the centre of each channel should be mined more than the sides."

Mines should extend right through the defense, to the very last intrenchment. Sir Lintorn Simmons once said, "A gun for the defense which can be reserved until the attack is in the last period is worth anything" (R. E. Papers, vol. xviii, 1870); and the same remark applies to mines. In a letter to the *Times*, 1855, signed "B.," and attributed to the late Sir John Burgoyne, we read, "one of the principal ingredients in defensive works is an obstacle to the approach of the assailants." On this principle

mines should be moored so as to help the forts when they are attacked, by obstructing those portions of the channel outside the forts at engaging distances.

“In conclusion, as regards submarine mining, it is important to remember that each harbor or place will form a special problem, and that the plans for defense by sea mines should be drawn up by an adept well versed in harbor defense generally and submarine mining in particular. The artillery defense must be carefully noted as well as the numerous local peculiarities of tidal currents, depth of water, facilities for navigation and other matters of this nature.” *

* The compiler desires to make acknowledgment to the various works of General H. L. Abbot, Corps of Engineers, U. S. Army ; to Colonel J. T. Bucknill, R. E., (Submarine Mines and Torpedoes, John Wiley & Son, No. 15 Astor Place, New York,) and to Mr. C. Sleeman (Torpedoes and Torpedo Warfare, Griffin & Co., The Hard, Portsmouth, England).

(To be continued.)

MACKENZIE'S LAST FIGHT WITH THE CHEYENNES:
A WINTER CAMPAIGN IN WYOMING
AND MONTANA, 1876-1877.

By CAPTAIN JOHN G. BOURKE, U. S. A.,

THIRD CAVALRY.

(Continued from JOURNAL No. 42.)

THERE we lay, afraid to breathe lest a cough or a sneeze should betray our presence; dreading the impatient champing of tired and frozen horses, or the echo awakened by the falling upon the ground of the carbine of some clumsy soldier.

"Sharp Nose," the Arapahoe chief, with dilated nostrils and flashing eyes, moved nervously from point to point on his wiry pony, looking the incarnation of the Spirit of War.

All the discontent and disquietude engendered during that night of cold and anxiety came to a head at that moment; our eyes nervously scanned the battlements behind which hostile sharp-shooters might within the next few hours be taking position. It might be our misfortune to have to fight our way back—who could tell?

There came a low, *Hist!* from the front where the Indian scouts had massed, impatiently awaiting the signal to dash forward. It was not long in coming. The rearmost company was reported "up." Every man was in place, every horse was pressing on the bit. Anything was preferable to another moment of suspense; the noise of the Cheyenne drums had ceased and *Gallop!* was the order.

I heard nothing more—all was rush and clamor and shock, but the rush and clamor and shock of thoroughly organized, pitiless war.

It was the rush of a mighty river, the roar of a giant engine, but each drop of water knew its destined channel, each element of the machine knew the function it had to perform.

Back from the walls of the cañon, repeated fifty-fold by the echo, sounded the sharp words of command, the neighing and plunging of excited steeds, the clatter and clangor of arms, the

ear-piercing shrieks and yells of savage allies, their blood-curdling war-songs, and the weird croon of the sacred flageolets of the Pawnee medicine men who, like the Celtic bards of old, rode boldly at the head of their people.

The Shoshonees and Bannocks followed Tom Cosgrove and Lieutenant Schuyler; Frank North led the Pawnees—these two detachments on the left and right flanks respectively, while down the centre thundered the solid column of Sioux, Cheyennes and Arapahoes, under Lieut. Philo Clark, a brave and brilliant cavalry officer, now dead, and Lieut. Hayden Delaney, who had faced the leaden tempests of twenty-eight pitched battles before he gained his cadetship, and yielded the palm of valor and coolness to no man in the Grand Old Army of the Tennessee, not even when U. S. Grant was its commander.

The cañon widened within a couple of hundred yards, forming an amphitheatre, giving room for our battalions to gallop front into line before sweeping across a small plateau alongside the village whose scores of lodges hugged the shelter of the stream-bed.

As our soldiers, red and white, rushed in at one end of the village, the frightened Cheyennes, tumbling half-naked from their beds, with nothing in their hands but rifles and belts of ammunition, were escaping from the other. In the exultation of the moment our people forgot the cold, the sleeplessness, the fatigue and hunger of the two previous days, and made the rocks resound with their cheers and shouts of derision. The Cheyennes answered never a word. They hurried women and children to places of comparative safety farther up the flanks of the mountains, and then crawling into sheltered nooks and crevices awakened the echoes with the sharp crack of rifles and the ominous ping! of bullets, each seeking its billet. Under cover of this fire, they perfected arrangements for the safety of their households, but reserved further demonstrations until a few bold youngsters stealthily creeping back through the mist of early morning should have driven out of our clutches the herd of several thousands of ponies, hundreds of which were already enveloped by our lines. Several of their warriors had already been killed or wounded in an endeavor to save this precious stock, and I may say that one of the most vividly remembered episodes of the whole affair is the balking of my horse at the stark and stiffening body of a dying Cheyenne boy who lay directly across my path shot through the neck as he was

bravely trying to stampede the ponies in the very teeth of our scouts. Wound loosely about his neck was his lariat; no doubt in my mind, that he had slept with it around or beside him, ready to spring out of his bed and rope the first pony he might run against in just such an emergency as this in which he had yielded up his young life to a sense of duty worthy of any Spartan.

But crawling in behind rocks and bluffs, dodging from tree to tree, and sneaking back among the *tépis* of the village itself, the bold, cunning Cheyennes were making ready to fight for their herds and drive us back down the cañon. The mist had lifted and the light of morning was filtering down into the cañon. The movements of the enemy were detected and General Mackenzie, realizing that not a moment was to be lost, ordered Lieut. John A. McKinney, with his company "M" of the 4th Cavalry to charge into the place where the enemy appeared to be concentrating. The brave young officer never faltered an instant, but charged across the plateau and down upon the Cheyennes, until he came to a gully with "cut" banks, which completely checked his advance. As his little command was wheeling by fours to the right to pass this obstacle, a small party of the hostile sharpshooters, concealed in and around the gully, and almost under our horses' bellies, opened a murderous fire, beneath which poor McKinney fell, struck by six bullets, six of his men wounded and a number of his horses shot. The company was thrown into confusion and several of the sets of fours turned in retreat. Mackenzie had observed the unfortunate turn of affairs and another company—that of Captain John M. Hamilton, 5th Cavalry, being at hand, he ordered it to the rescue, Major G. A. Gordon, 5th Cavalry, accompanying this charge with some men of the 4th and 5th not belonging to Hamilton.

The Cheyennes were unprepared for this second onslaught, which being most vigorously pressed, drove them back in confusion. Davis of the 4th Cavalry, coming up on Hamilton's flank followed in after the Cheyennes and boldly attacked them in the rocks and gullies where they tried to make a stand. This was the hottest part of the fight, and both Davis' and Hamilton's men had hand to hand fights with the savages; twenty of the bravest warriors of the Cheyennes bit the dust, and eight of their bodies fell into our hands. From all sides the enemy began closing in upon Davis, and would, I am certain, have wiped out both him and Hamilton, had it not been for the masterly judgment shown by

Lieutenant Schuyler who had ordered his Shoshonee scouts to make their way to the summit of a very steep crag which commanded the village, the plateau and the whole position, and was, in fact, the key-point. The joyous yell of the Shoshonees proved that they recognized the value of their success; half of them began a demoniacal dance of triumph to the music of the Cheyenne war-drum, captured on the ground where it lay just outside of the village; shrieks of joy almost drowned the roar of the volleys their more sagacious, but not a bit more blood-thirsty, comrades were pouring in upon the discomfited Cheyennes.

Mackenzie realized that the day was won, but he did not let the grass grow under his feet in taking every measure necessary to secure the fullest fruits of his victory. Hemphill of the 4th and Hamilton of the 5th, were ordered to seize and hold two high knolls on our right, and thus prevent any portion of the enemy from slipping in behind that flank and annoying us by a cross fire from the rear.

Captain A. B. Taylor and Lieutenant Wheeler, 5th Cavalry, made a gallant charge lengthwise through the village, forcing out the last lurking sharp-shooter and occupying the small fringe of timber just beyond the village, while Frank North and the Pawnees, darting in under cover of Taylor's movement, filled the village itself.

Russell and Wessells, with their companies of the 3d, covered the line between Hamilton and Taylor, while clusters of Arapahoe and Sioux marksmen held every clump of bushes, every projecting rock and every eminence along our whole front.

Three companies of the 4th, one of them McKinney's, were held in reserve behind protecting knolls, a short distance to the rear.

The day was won, and no one saw that better than did the Cheyennes. They could not retire from our immediate front with their women and children, because that would precipitate an attack and entail further loss. Their policy was to hold on to their natural fortifications in the high rocks, from which we could not dislodge them, until night-fall, and then withdraw with their families, their wounded and dead to some locality impregnable to assault.

Our men were peremptorily ordered to lie down under cover and to waste no ammunition. There were paroxysmal volleys from one side or the other, but the losses suffered were trifling,

and so far as the Americans were concerned there was no great amount of danger, shelter being adequate, except in the cases of aides-de-camp, orderlies and officers reporting for instructions who, in moving from one flank to the other, if not able to hug the cover of a favorable ravine, were compelled to ride full tilt, exposed to a more than generous share of leaden attentions from Cheyenne sharp-shooters.

One of our soldiers met with death in a rather curious way. He disregarded his orders, and lifted his head and shoulders above cover. Hardly had he done so before a Cheyenne rifleman had drawn bead and put a bullet through his jaws; knocked senseless by the blow, he fell forward, but still remaining on his feet, against the bank in front of him. The blood from his wound poured down his throat and choked him to death. Had he fallen head downward, the blood would have flowed out from his mouth, and his life, perhaps, been saved, as the wound was not necessarily a fatal one.

To dispel the monotony, numbers of the Cheyennes rode out under the fire of our Shoshonees and others, hurled their contempt and defiance at them, and then returned to their own lines.

There was something peculiarly irritating in all this to the Shoshonees, between whom and the Cheyennes a special hatred seemed to exist. The cañon became a perfect bedlam with the echoing and re-echoing of rifle volleys and the yells and counter-yells of exasperated savages, but through it all the Cheyennes would dash about on their war-horses, chanting their songs, and bearing charmed lives whose frail thread the fickle Fates disdained to cut.

There was one notably daring warrior or chief, a powerful looking man, riding a fine white horse and himself bearing on his left arm a circular shield of buffalo hide and upon his head a war-bonnet, whose pendant eagle plumes swept the ground at his horse's feet. Bullets struck the ground before him, behind him, beside him; the air groaned with the ominous whistle of Death's messengers, but each and all spared the grim Cheyenne who serenely rode along the front of our line, venting derision in the teeth of his foes, until the cool, deadly aim of Lieutenant Allison, of the 2d Cavalry, knocked him lifeless from his charger.

Before the cheers from the whites and their Indian allies had died away, there issued from the Cheyenne line a young warrior

gorgeous in his decorations of feathers, mounted upon a spirited pony, and bearing also upon his left arm a shield of buffalo hide, hardened in the fire and decorated with the plumage of the bald-headed eagle. This brave Cheyenne charged recklessly into the face of death, scorning the bullets which made the air hot about him, and chanting loudly the war-song proclaiming his determination to save from profane hands the corpse of his comrade and friend. On he flew, whipping into more energetic movement the faithful beast whose instinct warned it of imminent peril. Much sooner than it has taken to write this paragraph, he was bending over the bleeding form of the red-skinned Ajax, whose defiance was still sounding in our ears. Many were the expressions of admiration from our side as he lifted the body across the withers of the pony, and then springing lightly into the saddle, plied vigorously the quirt (or Indian whip of leather) and turned back to regain the friendly shelter of the rocks and gulches.

Escape seemed secure, but Fate was only mocking the poor wretch. In War, business is business, and bullets must fall upon the just and unjust, the cowardly and the brave.

Almost within hand-shake of his people, the heroic Cheyenne and his sturdy pony, freighted with so precious a burden, bore testimony to the precision of our marksmen, and fell pierced with many wounds. They had been comrades in battle and in campaign; and in death they were not divided. "Greater love than this hath no man than that he lay down his life for his friend."

The existence of this battle-comradeship among North-American tribes is a well-ascertained fact. The incident just described was one of many coming under my notice, not on this occasion alone, but at the fight on the Rosebud and elsewhere; it is more apparent, perhaps, among the Plains' tribes, but can be found among the Bannocks and others on the west of the Rockies.

There was a lull in the action for a few moments to allow Bill Roland and a small party of half-breeds and Cheyenne scouts to crawl up closer to the enemy's position and begin a parley. At first the enemy were disinclined to a conference, and were more desirous of showering bullets than compliments upon their interrogators. Curiosity conquered antipathy, however, and enough of a conversation was had to let us know that "Dull Knife" and "Little Wolf" were the chiefs in command. The former, with

two companions, approached near enough to let Roland know that he had had three sons killed in the fight and was personally willing to surrender, but unable to influence "Little Wolf," "Roman Nose," "Gray Head" and "Old Bear," who were all present with the village. These Indians called out to our Indian scouts: "Go home, you have nō business here. We can whip the white soldiers alone, but can't fight you, too."

Then others of the hostile Cheyennes approaching, called out that they were going over to a big Sioux village they asserted to be near by and get its assistance and come back and clean us out. "You have killed and hurt a heap of our people," they said, "you may as well stay now and kill the rest of us."

The talk of the Cheyennes was still fierce enough and their courage was unabated; had we foolishly attempted to force them out of their improvised rifle-pits in the crevices and behind the rocks on the hill sides, the loss of life would have been fearful. Prudence suggested that we make sure of what we had gained, move off all the herd of ponies rounded up by our Indian scouts, burn and destroy every vestige of the village, and send back to General Crook for the infantry with a view to having them bring their more powerful rifles to bear upon the hostiles in the morning in case they did not withdraw to another position during the darkness of night.

Our own losses were of course known: one commissioned officer (McKinney), six enlisted men killed; and twenty-six wounded. Thirty of the Cheyenne dead fell into our hands; sixteen scalps were taken, by Pawnees and Shoshonees; the other scouts did not take any, respecting the wishes and prejudices of the white soldiers about them. The full loss of the Cheyennes was never determined until their surrender at Red Cloud Agency, Dakota, a number of weeks after, when they submitted a list of forty killed, but never stated the number of wounded, either on account of superstition or some undefined repugnance to dwelling upon the topic.

Not the battle-field alone was unkind to them. From the desperate cold of the night immediately following they suffered as much. Eleven little babies froze to death in the arms of famished mothers, and ponies had to be killed that feeble old men and women might prolong their lives by inserting feet and legs in the warm entrails. This night was of unusual severity: the spirit-thermometers in our supply camp registered almost, al-

though not quite, 30° below zero. These facts were not learned, as I say, for some time after the fight. I prefer to introduce them here to make the story more coherent. It was always a difficult matter to get any of them to speak of their frozen children, or to name their dead. (An American Indian will never, except under the pressure of a grave exigency, mention the name of his mother-in-law, or of a friend who has lately died.) The gashed legs and arms of mourning widows and orphan girls were about as good a sign as any one could demand of the extent of their loss and the depth of the grief it had provoked.

The destruction of the village would have been a veritable triumph for us, without the killing or wounding of a single Cheyenne. Never had so rich and complete a prize fallen into the hands of the Regular Army from the day of its first organization.

Two hundred lodges,—nearly all of canvas, but a considerable percentage of buffalo hide,—were, each and every one, a magazine of ammunition, fixed and loose, and a depot of supplies of every mentionable kind.

A few, not more than half a dozen at most, were of extra large size, and filled with saddles and war-like trappings ranged round the circular floor; these were the convention halls or lodge rooms of the "soldier" societies; others, petty in dimensions, were allotted to women living in seclusion.

Not infrequently, artistic taste was evident in pictographs upon the hide or canvas walls; and where the head of a lodge was a person of importance, his shield, ornamented with his "totem," and "medicine," was suspended from a post or a tree-branch in front of the entrance.

Soldiers detailed upon a work of destruction have no time for indulgence in the contemplation of the æsthetic development of savages; a great task had been assigned us, and all that night and well into the next morning, Russell's troop of the 3d Cavalry and Davis' of the 4th toiled and burned, wiping off the face of the earth many products of aboriginal taste and industry which would have been gems in the cabinets of museums.

First, all the fat and marrow preserved by the squaws in great bladders and paunches were laid upon the lodge-fires, upon which were then piled the cords and cords of fuel gathered as the winter supply. The crackling flames roared and bellowed in their skyward rush through the covering of hide and canvas, but be-

fore the lodge-poles could fairly ignite, the explosion of kegs and cans of powder sent all the belongings of Cheyenne domestic life rocket-like to the zenith.

Never were orders more thoroughly executed. Experience had taught us in bitter lessons the preceding winter that villages only half destroyed were scarcely to be considered injured at all, and on this occasion the determination was to let not one square inch of canvas, of hide, of robe, or even of gunny sack be available for future use by the discomfited enemy.

Lodge-poles, not more than half burned, were broken into smaller fragments and thrown upon what it is no rhetorical flourish to call the funeral pyres of Cheyenne glory. Axes, spades, picks, shovels, hammers, scissors and knives were burned to deprive them of their temper: holes were knocked in the bottom of canteens, kettles, pans and all other utensils, before subjecting them to heat; saddles were smashed, bridle-reins cut, bits broken, and then thrown to the conflagration.

Many weapons of excellent make were seized and these were exempt from the common fate. Seven hundred head of stock fell into our hands, not quite one hundred of the number being loaded by our Pawnees with such plunder as appealed to their fancy.

How many tons of buffalo-meat were consumed, I couldn't pretend to say; when we took possession of the village we found immense stacks of it aggregating thousands of pounds and sufficient to last the enemy until spring; we didn't stop to estimate its amount, but promptly tossed it in alongside of blazing saddles and steaming fat, to add its quota of crackling noise to the detonation of bursting ammunition.

That this band of Cheyennes had been in the very thick of the fight with Custer was evident to the least discerning and increased the zeal which pressed us in our exertions.

As we watched the untanned buffalo skins, the robes and blankets baking to a crisp; or threw in alongside of them bottles of strychnine used by the Cheyennes to poison wolves, or bullet moulds and empty cartridge shells, useless to us, but priceless at this time to the enemy, there fell at our feet all the Lares and Penates of primitive man, with a liberal contribution of much that the taste of civilization could devise or its art and industry fabricate.

First, let me enumerate the principal features of the evidence implicating this particular band in the Custer Massacre.

A pillow-case made of a silk guidon of the 7th Cavalry.

A Guard Roster of Company "G," 7th Cavalry.

Memorandum books of the First Sergeants of the 7th Cavalry; one of these had in it an entry made the very day of the massacre: "Left Rosebud June 25th." This had subsequently been used by a Cheyenne warrior to contain the picture-history of his own prowess. On one page, he was to be seen murdering a poor teamster; on the next, he was killing a wretched miner. At one point, he was running away from Reno's barricade on the hill (represented by a round line of fire, with saddled horses lying down inside), amid a hurricane of bullets; in this rencontre, the Cheyenne represented himself wounded once and his horse four times. (This trophy is preserved in the Museum M.S.I.)

Cavalry horses branded U. S. and 7C.

Saddles, canteens, nose-bags, curry-combs, brushes, rosters of companies, shovels and axes—all marked with the letter of the company in the 7th Cavalry, to which they had belonged.

A book containing the names of the three best shots at each target-practice of Captain Donald McIntosh's company, 7th Cavalry.

An officer's blue Mackintosh cape.

A buckskin jacket, lined with taffeta, supposed from its marks and appearance to have been worn on the fatal day by Captain Tom Custer.

A gold pencil-case.

A silver watch.

Pocket-books, containing currency and coin. "Sharp Nose," the Arapahoe chief, in rummaging about in the tents, was the delighted discoverer of a wad of greenbacks containing not quite fifty dollars.

The hat of Sergeant William Allen, company "I," 3d Cavalry, killed in the fight of June 17th, 1876, with Crook's forces. (Identified by name on the band.)

Letters received from relatives at home and letters written and ready to be mailed; one to a young lady in the East had a stamp on it and everything ready for mailing.

Photographs, one of which I pasted in my note-book, where it still is. Among these, were also found: A full cartridge belt, with a silver plate, marked "Little Wolf," presented to this Indian when he was visiting Washington. This was taken from the body of a dead warrior to whom "Little Wolf" had given it, or who had won it from "Little Wolf," in gambling.

The scalps of two young girls, neither of full age ; one a flaxen-haired Caucasian ; the other, a Shoshonee.

A buckskin bag containing the right hands of twelve Shoshonee babies.

The hand and arm of a Shoshonee squaw.

The scalp of the Shoshonee warrior killed on our side at the Rosebud, June 17th ; recognized by his friends by the ornaments in the hair.

A necklace of human fingers. This ghastly specimen of aboriginal religious art, the especial "medicine" decoration of "High Wolf," the chief "medicine-man," can be inspected at the National Museum, Washington, D. C., where it was deposited by me last year.

Scalp shirts, fringed with human hair, savage and civilized.

War bonnets of eagle feathers.

Shields.

And many other specimens of dress, art and manufactures.

Many of the squaw's robes of delicately tanned antelope skin, encrusted with bead-work, or stained porcupine quills, or glistening with the nacreous lustre of elk teeth, were marvels of beauty.

The Cheyennes were not unmindful of the creature comforts. Plates, cups and saucers of china-ware ; spoons, knives, forks, scissors, coffee-pots, pillows, even mattresses, showed that the presence of the white man was beginning to develop new wants, excite new appetites. Alongside of these, were the primitive forms of implements—stone hammers and fruit and nut mashers for making the palatable compound known to the Sioux as "Toro," in which powdered buffalo meat, wild plums, and, occasionally, wild cherries, are beaten to a pulp and incorporated with boiling marrow : stone pipes, sometimes inlaid with silver, and at other times without ornament, but always accompanied by tobacco-bags, most elaborately ornamented with bead and quill work.

There was little sleep for our people throughout that cold, frosty night ; the Shoshonees, half-crazy with grief, gave full rein to their sorrow in weeping and singing, weirdly monotonous, but deeply impressive.

They reasoned, and subsequent events proved they reasoned wisely, that the Cheyennes had just returned from the destruction of one of the outlying villages of their tribe, in some ex-

posed position in the Wind River range, and that we had been listening to the savage dance which celebrated this fearful butchery. All sympathy was rejected; they surrendered themselves to the most abject grief, and letting their hair hang down over face and shoulders, danced and wailed, and wailed and danced until darkness had passed away, neglecting to assume the new battle-names which the Pawnees alongside of them adopted, according to the usage of the Plains' tribes, with much smoking and other ceremonial.

There was no shooting into our lines during the night, and when morning dawned on the 26th, no enemy was in sight, but a reconnaissance made by our Indian scouts developed them in a strong position six miles distant. No hostile demonstrations were exchanged and the day passed without incident.

Another dead Cheyenne was found in the rocks, and four other dead ponies were come upon, killed by our fire, and the skeletons of six butchered by the starving Cheyennes for food.

The column was ordered to saddle and move back to rejoin the infantry. As the march was taken up it began to snow heavily. Two or three Cheyennes entered their ruined village almost the moment our men had withdrawn and sat down and bewailed the spectacle of their desolated home. They were not molested. They were, of course, not a bit more afflicted than the others of their tribe, but possibly represented them all. Examples of just such Ceremonial Weeping I have seen at the Rosebud, at the Sun Dance and elsewhere. It was an observance known to the Hebrews, who, "by the waters of Babylon" "sat down and wept," and to other nations. We marched not more than twelve miles, the day being very cold, and our wounded needing careful attention. The bodies of our dead, frozen hard, were slung over the backs of pack-mules, which at first were restive and frightened, but by the end of an hour or so became reconciled to their ghastly cargoes.

The wounded were our greatest care. Lodge-poles, reserved from the destruction of the village, were arranged one on each side of an aparejo, the ends trailing on the ground, and blankets or gunny-sacks made fast in the manner of a cot or litter, in which the patient was placed, warmly wrapped, and thus dragged along the frozen soil.

The route became very slippery from the impress of hundreds

of hoofs; and, where intersected by deep ravines, almost impassable for these "travois." In one particularly bad place the frightened mules had to be pushed over the edge of the declivity, and allowed to slide down, sustained by stout ropes held by the enlisted men, and the ends of the "travois" supported in like manner.

And when we reached Willow Creek, which we crossed before going into camp on the other side, the extremities of the "travois" poles were secured in the bight of a rope, held by men on horseback riding alongside.

The beneficial effect of "travois" travelling upon the health of wounded men, is due, it seems to me, to the absence of jolting and the fact that, in every position the sick man's head is higher than the body.

A detachment of our Pawnees and Shoshonees who had gone on a reconnaissance to develop the enemy's position, and, if possible, determine his intentions, rejoined us during the day. They succeeded in getting in upon the remnant of the Cheyenne herd and were making off with over one hundred ponies, when their presence was discovered, and had it not been for the providential interposition of a dense snow-storm, their lives would have paid forfeit for their temerity. They escaped with a few of the ponies and the information, highly appreciated by us, that the Cheyennes seemed badly cut up, almost naked, without blankets, moccasins or ammunition, and hauling many wounded in the direction of the head of Crazy Woman's Fork of the Powder.

There was a wounded Shoshonee—"Anzi," by name—shot through the intestines and marked, so our surgeons said, for death. It was really no use trying to save him and all that could be done was to give him as much whiskey as he wanted, with a trifle of morphia.

Anzi's thirst for whiskey was very much like a New York alderman's thirst for "boodle;" the more he got the more he wanted. The medical panniers were emptied for him and the last drop poured into his mouth, to his inexpressible pleasure; but finding that no more was to come, with many an imprecation upon the "Mellican Medicine-man," he rolled out of his "travois" and was assisted to the back of a pony which he rode all day. He basely went back on the doctors' predictions, returned with his people across the mountains, nearly two hundred miles of travel, and when I saw him at Fort Washakie, dur-

ing the Nez Percé campaign in the following year, he was still living, although by no means, so his friends told me, the man he had been before being so terribly wounded.

The remainder of the march back to the supply camp was almost featureless. One of our wounded men, a brave soldier named McFarland, died on the 28th of November, and the same day we had to face another rather stiff snow-storm with the usual polar breeze.

General Crook, with Colonels Dodge and Townsend with the infantry and artillery, had made a forced march to join us, overcoming every obstacle of cutting wind, driving snow and frozen trail, marching night and day continuously until the head of our column was sighted when they took the back-trail to the supply-camp.

The Commanding General's telegram to the War Department announcing Mackenzie's fight contains the following paragraph: "I can't commend too highly his brilliant achievements and the gallantry of the troops of his command. This will be a terrible blow to the hostiles, as those Cheyennes were not only their bravest warriors but have been the head and front of most all the raids and deviltry committed in this country."

A reply to this reached us in a few days, Sheridan saying: "It gives me great pleasure to transmit to you the following dispatch from the General of the Army, to which I add my own congratulations." And Sherman to Sheridan: "Please convey to Generals Crook and Mackenzie my congratulations, and assure them that we appreciate highly the services of our brave officers and men who are now fighting savages in the most inhospitable regions of our continent. I hope their efforts this winter will result in perfect success and that our troops will hereafter be spared the necessity of these hard winter campaigns."

Thanksgiving Day, November 30th, 1876, was devoted to the mortuary services of all our dead, excepting Lieutenant McKinney, whose body, enclosed in a pine box, was forwarded under charge of Lieut. O. L. Wieting, 23d Infantry, to Memphis, Tenn.

The graves were excavated on the summit of a low terrace and arranged side by side.

There was no gorgeous ritual, no solemn chant, no peal of cathedral organ or sad refrain of cathedral bell, but more tenderly imposing than all these was the funeral procession of over six

hundred weather-beaten veterans, headed by Generals George Crook, Ranald Mackenzie, Colonels Dodge, Townsend and Gordon, with the members of their Staffs, and the hundreds of savage auxiliaries—which moved with measured tread to the place of sepulture and there halted until the extracts from the Book of Common Prayer had been read.

The usual funeral salute was fired, and then the bugles sang “taps” and our heroes were left to sleep their last sleep undisturbed.

The expedition next worked its way down to the Belle Fourche and the country at the extreme head of the Little Missouri. On the 1st of December, Sergeant Patterson of Captain Hemphill’s company, 4th Cavalry, was killed by having his horse slip under him on the icy ground, the shock rupturing a blood vessel inside the Sergeant’s body, producing instant death.

On the 3d of that month, our Shoshonee guides after full consultation with General Crook, made up their minds to return home and look after their people, being still apprehensive that some great disaster had overtaken one of their villages, as proved afterwards to have been the case. Our parting with them was such as would take place between brothers bound together by the ties of dangers conquered and elements defied together.

The wounded and sick, with the horses that had begun to play out were ordered back to Fort Fetterman, under command of Colonel Gordon, an officer whose memory will not fade among his comrades so long as gallantry shall be held in honor, or genial wit and good-fellowship be looked upon as worthy qualities in a soldier.

It is hardly worth while to repeat scenes of distress and discomfort ; my readers must by this time have come to the conclusion that we were not on a summer picnic. Almost every day a fierce blizzard paid us its respects, and nearly every night saw us bivouac in some spot where water was scarce, alkaline and muddy ; fuel scanty and poor ; in fact, but grease-wood and sage-brush. At the rise of the “Little Powder” we had to use water from a “water-hole” swarming with wriggling worms. We boiled the fluid but made as little use of it as possible, fearing results such as happen in Guinea, under the same circumstances.

Of food for our men there was no lack ; the pack-trains carried a sufficiency of rations, and back with the wagons more

ample supplies were always to be had. The occasion of anxiety was the forage for the animals; even with every wounded man and every broken-down horse culled out, and one hundred Shoshonees ordered back to their homes, there were needed thirty thousand pounds of grain per diem, and grain we had to have, the ground being mantled with snow, and grass not always accessible. 500,000 pounds had been accumulated at Fetterman, as much at Reno, and 300,000 pounds every fortnight were to move from the railroad to Fetterman, there to await such orders as might be sent in, but the dispatches received about December 10th from Colonel Carleton, 3d Cavalry, commanding Fort Fetterman, were decidedly discouraging. The severe storms of snow and wind had blockaded the Union Pacific Railroad, choked up "Medicine Bow" Gap, and made travel for wagons almost an impossibility. The companies of cavalry left at Fetterman had been dismounted and the horses put in carts, wagons and every kind of wheeled vehicle to hurry forage to the front, and yet the supply was inadequate, and it seemed as if many of our poor horses were fated to pave with their bones the trail we had followed.

The human beings had no cause to complain; my notes record that on December 9th no less than seventy-five elk, deer, antelope and big jackass rabbits were killed—and there are occasional references to porcupine—altogether enough to make a toothsome addition to the components of the army ration.

Frank Guard, our chief scout, Ben Rowland and others, helped me as much as possible in getting together vocabularies of the Arapahoe, Cheyenne, Pawnee and Sioux languages.

I was not ignorant enough to give the slightest credit to the sensational story set afloat by Burton, the English traveller, to the effect that the Arapahoe dialect was so meagre that for purposes of conversation the members of that tribe had to rely upon the "Sign Language." This statement had been quoted by E. B. Tyler in his "Early History of Mankind," a work I had with me, and it was therefore proper to verify or refute it. It took a very small examination to satisfy me that the Arapahoe tongue was copious, and, if deprived of its guttural and nasal modulation, would not be without beauty and softness.

The Cheyennes followed upon our trail and made two attacks upon careless parties of miners; in the first instance, no harm was done, but in the other, the results were very serious. There were

eleven miners, who feeling a false security from being so near our camp, concluded to go to sleep without posting sentinels, at the coal-measure where Major Furey had had his blacksmiths at work during the day shoeing the mules of the wagon train. The attacking party of five Cheyennes was bold in its onslaught. A volley was poured in among the sleeping miners, none of whom was hurt, with the exception of one brained with his own axe. All the horses, blankets, guns, ammunition and provisions left behind by the miners in their flight fell into the hands of the Cheyennes.

Information reached camp shortly before midnight ; a squad of Pawnee scouts was dispatched at once, but, beyond developing the above facts, was unsuccessful in pursuit. The Cheyennes had broken into small fragments, the better to obtain food in the chase, and also the more successfully to elude pursuit. Whether it was the party just spoken of or some other, I can't say, but we were informed a few weeks after at Red Cloud Agency that a couple of the Cheyennes had crept up to within ear-shot of one of our camp-fires and satisfied themselves that we really had a good-sized detachment of their own people among our auxiliaries ; during the fight they refused to believe that there were any Cheyennes on our side save Bill Roland and may be two or three half-breeds. This was the last straw ; they saw that further resistance would be useless and acted upon their convictions by surrendering at Red Cloud Agency. On the 20th of December the very unwelcome news came from General Sheridan that our expenses for " transportation," etc., had exceeded a monthly average of \$60,000, while the appropriations would not admit of more than \$28,000 being spent. This was tantamount to an order to abandon the campaign. Our horses and mules were doing their best on half-rations, but couldn't do that very long if we were not to be able to hire transportation to supply them with food. The expedition was at that time on the Belle Fourche, on the N. W. corner of the Black Hills ; from that point, it slowly worked its way back to Fetterman, there to disband until the advent of spring should enable the animals to derive some nutriment from the grass.

Antelope and elk were seen at intervals and some brought down. The Indians imparted their ideas on the subject of cookery. A few of their dishes are not by any means unpalatable. An elk heart, boiled in salt water is good enough for anybody. Ante-

lope liver, sliced thin, laid on hot embers until done on both sides, is extremely appetizing. A deer or antelope head, roasted in the ashes, is toothsome, and some of the preparations of buffalo entrails, cooked in the same manner (which, however, we had eaten during the preceding summer and winter, and not on this expedition) were savory and palatable. My scientific enthusiasm did not sustain me to the pitch of trying the half-melted liver of an elk which had been chased over half a county and upon which liver there had been sprinkled a pinch of gall: I couldn't try that, but I did share in a handful of elk-liver, fresh from the animal, and found it to taste very much like a raw oyster. Despite the arctic temperature, which began to tell on the mules and horses, some of which would be found stiff and glassy-eyed each morning, and upon officers and men, among whom the surgeons found sufficient employment for their leisure moments in treating frozen feet, hands, ears and noses, the Indian scouts, constrained by a sense of duty which didn't allow them to wait for an invitation, gave the camp a serenade almost every night. First, the Sioux serenaded the Pawnees, danced for them and made presents of horses; the next night the Pawnees sang, danced and gave the old crow-baits back. Ditto, the whole business for the Arapahoes; ditto for the Cheyennes. Then the Arapahoes, fired by enthusiasm, went over the whole programme with the Sioux and we had to endure another round of dittoes. Nobody growled about that; we were assured it was a ceremonial observance among our aboriginal friends and having been paid to cheerfully suffer all such little privations, we made the best face we could over the matter and smiled through our tears.

It took us very little time to discover that the gentle savage is as full of tricks as Adelina Patti.

Just as we were getting ready for a real good honest sleep, the Pawnees started in on a Farewell Tour; the Sioux, not to be outdone, and "in deference to the urgent request of many patrons, kindly consented to appear for this night only;" and the Arapahoes "yielding to the importunate demands of a clamorous public had cancelled important European engagements in order to, etc., etc., etc." We managed to live through it all. It was a very gloomy season in our lives, one I would gladly bury in oblivion.

Judge of my feelings when I say that one of the first things I was asked in Washington was to write a treatise on Indian music!

The weather grew colder and colder. To save our animals as much as possible they were not tied up at night, but allowed to run round unrestrained for the double purpose of keeping themselves warm under the shelter of friendly knolls, and of getting such nibbles of grass as might be found in sheltered spots not covered by snow. Wherever we could provide it, cottonwood foliage was fed to the mules; it is bitter, but not unpalatable, and much used by the Indians for their ponies in winter.

The sharp cold air of these winter mornings had the effect of intensifying the profane powers of our packers and teamsters whose language is quite often as amusing from its originality as it is shocking in its blasphemy and irreverence.

Whack! goes the whip, and ——! ——! ——! comes a torrent of objurgation from the irate mule-drivers. The mule's long ears catch the stream of unsanctified music floating through the air which warns him that "business" is meant. So he begins to tug in dead earnest on the traces, and with the encouragement of another crack or two from the "black-snake," and another string of expletives, succeeds, with the help of his comrades, in pulling the wagon through the mud-hole or snow-drift in which it has mired.

This is an outline description of their behavior under ordinary circumstances. In the presence of graver difficulties, they become appalled and not even the encomiums of the mule-drivers can induce them to advance one foot before the other.

Suppose the wagon at the foot of a steep acclivity, the ground incrustated with ice or frozen snow. The "leaders" look upward and see the case is hopeless. They consult with each other. Mules are the greatest animals in the world for consulting together, and when the driver of a team sees his animals turning their heads towards each other and about to begin a conference, he at once abandons the struggle in despair, altho' he usually cracks his whip half a dozen times and explodes in a volley of objurgation, by way of dignified retreat. The next step is to send for the pioneer party which loses no time in breaking into the sandy ground, frozen hard as flint by the inclement winds. After a footing has been picked out and dug out for the mules, long ropes are attached to the wagon-tongue, and strong hands take hold and pull, while hands equally strong seize upon axle and wagon-body and push with might and main.

The mules may still refuse to stir a hoof; the genuine army mule

loves to be coaxed, and if the driver be not a fraud now is the opportunity to demonstrate that his wages have not been paid him in vain. "Whoop! Whoop-la! Gee! Gee! You Puss-mules! You Billy! Damn you, Billy! You ——! ——! —— Billy! Dick! You Keno!"

The men whoop and yell and cheer and push and pull. All at once, the mules make a simultaneous effort and jerk the wagon up the grade on a run. Then the teamster licks his mules, just for luck; the wagon-master damns the teamster, the quartermaster damns the wagon-master and the pioneer party damn the quartermaster. But the team has surmounted its last difficulty before reaching camp for the night, and the voices of the mules are now upraised in a song of gladness. Much objection has been made to this chanting, as practised by mules, but the objection strikes me as frivolous and untenable. The mule's song may be just a particle monotonous and the nasal pitch he commonly employs, somewhat harsh for cultivated ears, but the question of pitch is a question of taste, and the mule's taste may be better than our own; or, if worse, this is the land of liberty, and the mule is free to enjoy himself as he pleases.

The charge of monotony is true, but it applies with equal force to the song of the lark, we all pretend to admire. We may admit the mule's lack of taste and skill in the rendition of his scanty repertoire, but we cannot deny him a full meed of praise for the earnestness with which he throws his whole soul into his work and pours forth his voice in song.

The pack-trains have frequently received my favorable notice in these pages. I can only add to what has already been said, that in winter as in summer and spring, our packers, under the able supervision of Tom Moore, attended with an assiduity almost devotion to the wants of the animals under their care. Some of them were droll fellows; all of them far above the average in intelligence, or above what their rough garb and unshaved faces would lead an observer to imagine. Seated by the camp-fire by night, I often listened to their conversation and never failed to be impressed with the clearness and accuracy of their judgment.

While on the Belle Fourche, one of them came up to see me. He was considerably under the influence of Black Hills whiskey brought in by parties from Deadwood. He began narrating his "up and downs," or more strictly speaking, his unchanging "downs" in the world. He had been a private soldier in the

4th Infantry before the War, at the period when Grant, Sheridan, Kautz, Stanley, Hood and Augur were captains and lieutenants in that regiment ; "and now," he said, musingly, "they've every last one of them been made a general ; 'n who 'm I? Nobody. I never was nobody. I never expect to be nobody. The highest I ever got to be in the world was a lance-corporal's bunkey."

Slowly we progressed southward to the line of the North Platte, the days becoming colder and colder, the nights more and more dismal : to keep one's head out from under the protection of buffalo robes meant frozen ears and nose ; to keep it under threatened suffocation.

There was about the winter scenery of that part of Wyoming a bleak and barren dreariness, whose monotony at times appalled the traveller conscious of its magnitude.

Mile succeeded mile as the column advanced, but no change occurred in the perspective of snow-mantled hillocks, gashed with ravines and tufted on their summits with a scanty line of timber. The leaden pall of the cloudy sky was an effective setting for the cheerless landscape which, in spite of its gloom, had still a weird fascination over the sight which never tired of looking at it.

The winding courses of the streams were defined by the skeleton limbs of trees, whence every bird had flown. Even crows and such carrion eaters were seen only at intervals, but once or twice the honk-honking of wild geese, high in air, announced a migration of those birds to the South.

One of the most disagreeable days in my experience was Christmas, 1876. We were pushing across the Pumpkin Buttes, doing our best to get into bivouac and escape the fury of the elements, which seemed eager to devour us. Beards, moustaches, eye-lashes and eye-brows were frozen masses of ice. The keen air was filled with minute crystals, each cutting the tender skin like a razor, while feet and hands ached as if beaten with clubs. Horses and mules shivered while they stood in column, their flanks white with crystals of perspiration congealed on their bodies, and their nostrils bristling with icicles.

Two of our thermometers indicated 26° below zero, Fahrenheit ; neither was of any service. Spirit glasses in Deadwood registered that day 40° below, and in Fort Sanders, Wyoming, 58° below zero, Fahrenheit, and we were in the direct line of the blast howling between those two points.

Major George M. Randall joined us with seventy-six Crow Indians, all that remained of over two hundred, who had started out from the Agency in the Judith Basin, Montana. Their march had been one of phenomenal severity: crossing the Yellowstone at the mouth of Clark's Fork, up that and the Big Rosebud to their heads, thence to the Gray Bull and Stinking Water, on to the Big Horn River, across it and the Big Horn Mountains to the source of the Tongue—down that a few miles, and then south to Cantonment Reno, and thence on our trail until they overtook us, returning at Pumpkin Buttes. Most of the Crows became thoroughly disheartened and declined to face the fearful inclemency of the weather. Randall and his interpreter, Fox, endeavored without avail to persuade them to continue. The greater number returned to the Agency, spreading the report that Randall and their comrades had been frozen to death in a snow-storm in the Big Horn Mountains. This had almost been the case. In the worst of the storm Randall's people discovered that they were in the midst of a small herd of buffalo, and began shooting right and left. The warm carcasses furnished protection to the nearly frozen feet and legs, which were thrust into them, and raw steaks devoured greedily by famished stomachs that had eaten nothing for more than two days.

When within less than fifty miles of Fetterman, we found waiting for us Louis Richaud, a half-breed Frenchman and more than two hundred scouts, from the Spotted Tail Agency. The change in the programme sent them back, slightly in advance of the expedition, their horses being in prime condition.

The impossibility of procuring anything like a sufficiency of forage for the cavalry, compelled the expedition to march to Fort Laramie and other points, to be put in good condition for the earliest days of spring. But the Spring campaign was not to be. There remained but one band of any size, in spirit to fight, on the American side of the British Line,—the band of "Crazy Horse," one of the foremost of the hostile Sioux chiefs. The Cheyennes were broken and humbled, and runners from them had arrived at Red Cloud Agency to say that they were coming in as fast as they could to surrender, and were so dissatisfied with the inhospitable reception granted them by "Crazy Horse" when they sought shelter in his camp after the fight of the 25th November that they would gladly go out to attack him with the American forces.

The game was in our hands, and, after the weary marching and countermarching of two winter campaigns, and one during the summer which for severity was almost Hobson's choice,—after fighting the enemy on the lower Powder, Montana, in February and March; on the Tongue River, Wyoming, and on the Rosebud, Montana, in June; on Goose Creek, Wyoming, in July; at Slim Buttes, Dakota, in September, and on Willow Creek, in November, we had the gratification of receiving messengers begging the Government to stay its hand, and give all those on the war-path a chance to collect their wives and families and bring them to the Reservation.

"Spotted Tail," one of the shrewdest of the American aborigines, frankly admitted that further resistance on the part of the hostiles would be suicide and not warfare; twelve months previously, his sarcastic predictions of the dangers to befall the troops had proved him to be at least a sympathizer with those of his tribe arrayed against the Government.

But for reasons not necessary to recapitulate he was at this period most anxious to be individually the means of bringing in "Crazy Horse," and thus solidifying his position in the tribe and with the Government.

After submitting his proposition to General Crook, and having conferred fully with Colonel Julius W. Mason, 3rd Cavalry, commanding the troops on his Reservation, he started out to see "Crazy Horse," and had no difficulty in letting that stubborn red-skin understand that he must come in on the full run.

There would be the same, and possibly a larger force of white soldiery to fight when the snow melted, there was no help to be expected from the Reservations, which were under strict surveillance and, worst feature of all, was the certainty that more than one thousand Indian scouts, regularly enlisted or going along as free-lances, would obey the orders of the Government when the movement began.

So, first the Cheyennes, under "Dull Knife" and "Little Wolf," surrendered, making but one condition, that they be allowed to send their warriors with the white soldiers to fight "Crazy Horse; and lastly, "Crazy Horse" himself and his band.

The aggregate of men, women and children thus surrendering at "Red Cloud" and "Spotted Tail" agencies, was not quite four thousand five hundred, but of the ponies, which ran up into

the thousands, I failed to keep a complete record. "Crazy Horse's" people alone had more than two thousand.

My relations with these people, either in Peace or War, did not terminate here, but the expedition did and so must my story which, disconnected and hastily prepared as it is, will still, I hope, give my readers a good, general idea of the manner in which our expeditions were conducted against the savage tribes in the unknown region which has within the past winter supplied our national standard with the beautiful stars of the two Dakotas and Montana, and will soon, I trust, add still another for Wyoming.

THE INSTRUCTION OF NON-COMMISSIONED OFFICERS IN THE ARMY.

BY FIRST LIEUT. HARVEY C. CARBAUGH, U. S. A.,

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WE have reached a point in our military establishment where the subject of the general education of our non-commissioned officers presents itself. By general education is meant the possession of knowledge outside of purely military subjects. Shall we attempt this general education? Is there any real necessity which urges it? If so, to what end?

It seems to the writer that the main object in view in the instruction of non-commissioned officers in subjects other than purely military ones is to make possible a more perfect military education, for as Boguslawsky says: "The education of a nation in general, and its military education in particular, are the sources of the tactical efficiency of an army."

Another object often suggested is, in order that the end of a period of enlistment may find the man better fitted, by his service in the Army, to fill a position in civil life. However, this seems secondary to the main purpose just suggested and can hardly be presented as a controlling element in selecting a course of instruction. Looking at the subject from a military standpoint, should we undertake the general education of our non-commissioned officers, and if so, in what way?

It would certainly be an injustice to say that, for military purposes, we do not possess in our present body of non-commissioned officers a very respectable and efficient lot of men, capable of understanding and profiting by special instruction. We must remember that, for military efficiency, intellectual ability is not the first requisite of a good non-commissioned officer; tact, common-sense, strength of character, thorough honesty and trustworthiness are essentials which can be made more valuable, but cannot be supplied by general education. As to the necessity for special instruction the following opinions recently expressed may be quoted:

The Secretary of War says: "Give the soldier an opportunity to so improve himself, that when he leaves the Service he may be better fitted for civil life than when he entered it. Post schools should be established, where not only instruction by lessons and lectures should be given in matters pertaining to military service, but also in the elementary branches of mathematics, science, mechanics, surveying, engineering, drawing, etc."

The Adjutant-General of the Army says: "It must be admitted that the rapid advance in the Art of War requires more study, closer application and greater capacity on the part of non-commissioned officers than in former years. * * * The first sergeant must have tact, sound judgment, superior intelligence, and have a thorough knowledge of all details, orders and papers pertaining to company administration."

The Inspector-General of the Army says: "We cannot recognize too clearly that modern warfare makes enlarged demands upon the abilities of non-commissioned officers, and their character, instruction and familiarity with responsibility is of very special importance to us, as from them we take a considerable number of our officers. A certain deterioration in the instruction and abilities of our non-commissioned officers is reported, a serious matter in any Service that attempts a perfect performance of military duty, and we cannot afford to admit or permit inferior quality in so important a particular." These views not only indicate that the general education of our non-commissioned officers ought to be advanced, but to a certain extent show the reasons for it and the subjects to be included. While the demand for intellectual improvement is found in the requirements of modern warfare, I fancy that practical reasons also lie in the necessity for the military establishment to keep pace with its contemporary civil institutions and in the future usefulness of the Army as a national training school in which to keep alive the military spirit of the people and to secure the intelligent development and advancement of military principles, without which civil liberty in its widest sense cannot be secure. If we consider the demands made upon a non-commissioned officer of artillery as to the use of surveying, meteorological and engineering instruments we must admit a necessity for intelligence and skill beyond that possessed by the best equipped recruit. Similar demands might be suggested in regard to the non-commissioned officers of the other branches of the Service. While the necessity for greater

knowledge and skill must be conceded, yet the subject is one calling for conservatism all along the line, not only as to the extent such education should be pursued, but also as to the methods to be adopted. The non-commissioned officers, as a rule, are men of limited intellectual capacity. They are of mature years, and have passed the schoolboy period of close study, recitation and resulting mental development. The system to be pursued must aim at storing a mind already developed with necessary information, and in training the man by practical exercises, repeated, until he becomes, as it were, a skilled mechanic in the use of such information. How shall this necessary information be imparted to the man? Plainly, not by any attempt to assign lessons to be studied thereby hoping to increase the calibre of his mind by compelling him to overcome intellectual difficulties, but, by illustrations and actual demonstrations, made before him, of the things to be taught. Not by dry, abstruse, theoretical lectures on scientific subjects, but, by clear and practical applications of the facts he is to learn.

Having explained a fact and demonstrated its application, a well illustrated text-book should then be placed into the man's hands. Such a text will recall to his mind by pictures and reading matter the subjects already taught. Nothing should be theory, everything should be practice. The information thus obtained will be more easily remembered by reference to an illustrated text, which will keep in view as a definite whole the things taught. We all appreciate that, after a certain amount of instruction, the memory should be aided by suggestions through the eye. Such an aid or reference book would serve another purpose in being a guide, not only for the person instructed, but for the instructor, which would do a great deal to secure uniformity and definitiveness in the choice of subjects.

In suggesting the subjects to be taught, we are met at the outset by a difficulty which the Post school, aided by careful selections of future appointees, should be able to remove. I refer to the fact that many of our non-commissioned officers possess little or no skill in the ordinary and fundamental operations of arithmetic to include fractions. As almost any mechanic must be able to perform these operations, I venture to assume that very little trouble need be expected in removing this defect.

The subjects in which non-commissioned officers are to be instructed should include only practical and useful information. Its

application can then be practised until habit, in addition to thought, makes it ready for any particular purpose.

The arrangement of this information into a course of instruction calls for a systematic and logical order. It should be sufficiently in detail to suit the ability of the learner and to meet the necessities of the Service and yet allow latitude for individuality on the part of the Instructor.

General Orders No. 47, of 1889, issued from the headquarters of the Army, outlines in a comprehensive manner the subjects in which a non-commissioned officer of artillery should be instructed. The following outline is suggested as embracing the subjects for all non-commissioned officers in the Army.

OUTLINE.

1. The units of measurement, linear, surface and angular ; and their application in elementary field geometry.
2. Direct measurement of distances and surfaces.
3. The care, setting up, and use of angle measuring instruments.
4. The use of data obtained by means of angle measuring instruments, including the use of logarithms and the solution of plane triangles.
5. Indirect measurement of distances with and without special instruments.
6. Setting up meteorological instruments, care and reading of same, and use of the data thus obtained.
7. Electricity and its application—simple electrical tests and measurements.
8. The general and special properties of bodies,—the cause and effect of motion, and principles involved in pointing guns.
9. Power and machines, to include the use of the most important sources of power.
10. Engineering as used in field sketching and in the construction of temporary cover, roads and bridges.

In this outline all matters relating purely to tactics or the care and use of arms and other property connected with the different arms of the Service have been excluded, the intention being to present a course of instruction which will make men "handy and ready." It includes a wide range of subjects, yet they seem possible of being combined and presented in a simple and effective manner.

The inducements to be used in securing progress must also be considered. Comment upon this subject may seem heretical in a military organization when orders are all that ought to be necessary in securing the performance of any duty. This is true of matters of a purely physical nature, but when the action of the mind is to be called into play exact performance cannot be secured by command alone. The failure will not always be due to lack of ability on the part of the learner. With us no cast-

iron rule of reduction in rank, discharge or other punishment upon failure can be profitably followed, therefore proper inducements should form a part of the system.

Intellectual activity must be awakened by attractive means and the process of storing up information rendered interesting. True, there is no royal road to be followed in the abstract, but relatively there is. A competent and interested instructor will develop interest, even enthusiasm, in very dull sensibilities and make plain and simple what under ordinary circumstances would be incomprehensible. Lessons, therefore, should never be assigned for future study and recitation, but should be illustrated, practised and then studied. Non-commissioned officers are not adverse to obtaining information, though they may be extremely adverse to mental efforts in the seclusion of a study room.

The increased importance of those who have obtained a required degree of proficiency may be regarded as an effective inducement. At present we hold out a commission as an inducement for becoming a meritorious non-commissioned officer. This is something of a delusion, if not a snare, and is liable to be used by persons of limited education as a short and easy road by which to secure a commission.

The inducement of a commission is, therefore, of but little avail to elevate the general tone of non-commissioned officers. We may quote Major Sanger's remarks on this subject as being to the point: "I do not observe any noticeable differences in the character of the enlisted men, who appear to maintain about the same standard. The very simple test for promotion from the ranks to the grade of second lieutenant has no doubt been the means of inducing many young men of the better class to enlist with the hope of obtaining a commission; but whether this has resulted beneficially to the Army is problematical. Until the educational standard of candidates for promotion is raised to the ordinary requirements of our country high schools, no ultimate good to the Service should be expected from such promotions, for however well a non-commissioned officer may do as a second lieutenant, he is almost certain to fail in the higher grades, unless his educational requirements are far above those now considered necessary."

To this may be added that the educational standard should include proficiency in those subjects of which a knowledge will directly increase the efficiency of a non-commissioned officer.

The increased importance to be held out as an inducement to mental improvement should be certain and depend only upon the candidates reaching the standard. The Major-General commanding the Army states the case as follows: "The efficiency of the Army and the welfare and contentment of the enlisted men depend largely upon the non-commissioned officers. Hence it is very important that the character and dignity of the latter be elevated as much as possible. The vacancies available for the promotion of enlisted men to the grade of second lieutenant are necessarily very few in number, and the most meritorious non-commissioned officers are too old to commence a career as commissioned officers. Hence each non-commissioned grade should be made a real reward for meritorious service." This recommendation, aside from striking the key-note, comes with an authority which is indisputable.

There is another thought that might be added, inasmuch as increased importance carries with it increased pay, that only such non-commissioned officers as possess a certificate of having reached the educational standard shall be entitled to increased pay.

The first step in the higher education of our non-commissioned officers seems to be in securing an increase in their general education. This is the foundation which is essential for securing discipline and moral ascendancy over the men and the consequent development of a military system to meet the requirement of the age, and without which their professional instruction cannot be carried to the required degree of perfection.

A TRIP TO INDIA, CHINA AND JAPAN.

BY CAPTAIN S. M. MILLS, U. S. A.,

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(Continued from JOURNAL NO. 42.)

THE manner of disposing of the dead in India is a feature of the country to which one is forced to have his attention called, and although rather a gruesome subject, if you will permit, I will mention some of the methods and ceremonies followed, as you do not often find them described.

The Mussulman or Mohammedans bury their dead, and although attended with peculiar ceremonies, they are not so striking as that followed by some other sects or people.

The Hindoos cremate or burn the bodies of the dead to ashes. Death has no terrors for them, since it is only a change of existence. Alongside of the most fashionable drive, "Queen's Road" to Malabar Hill, is situated the Hindoo cremation ground.

When a Hindoo dies, information is sent to the friends and relatives of the deceased. These assemble forthwith and some of them go to the bazaars to buy the necessary articles for the ceremony. They procure two strong bamboos for the bier, chips of bamboo, a piece of white shirting, an earthen pot, copper pots, pieces of sandal wood, clarified butter, rice, and if the weather be wet some rosin and oil to replenish the flames. When the men return from the bazaar they make a bier, over which, when ready, some leaves and sacred grass, called "durbhas," are spread. The ceremony ought to be performed by the son of the deceased. Happy is the Hindoo who, when dying, has a son to perform these rites. In his absence it is performed by the brother, father or other member of the family. Whoever performs it must bathe, then shave off his mustache, and bathe again. All the while sacred hymns from the Vedas are recited by the officiating priest. In fact, every part of the ceremony is attended with the recital of sacred hymns. Sacred fire is kindled in the earthen pot, after which the body is taken out of the

house by the friends and near relatives. It is well washed, a piece of cloth is passed around the waist, and the body is then placed upon the bier and covered by a cloth, but the face is left exposed. The bier is then borne away by the friends, the chief mourner, who is to light the funeral pile, walks before the procession with the earthen pot in his hands. All the mourners must be bareheaded.

When the procession arrives at the burning ground, the bier is placed on the ground, and they commence to erect the pile. Four holes are made and strong posts about five feet high are fixed in them. Between these posts the pile is erected. When half the pile is finished the body is removed from the bier and placed over the pile, whereupon some of the relatives and friends place sandal-wood over the body. Prayers are repeated, and the remaining fuel is heaped over the body to complete the pile.

Then the son or chief mourner walks around the pile three times and sets fire to it. In about fifteen minutes it is a huge flame, and in about two and a half or three hours the entire body is reduced to ashes. Then the fire is quenched, all the mourners being required to drop some water on the spot in the name of the deceased, after which the whole procession repair to the sea or to a tank to bathe. Thence they proceed to the residence of the deceased, see the lamp which was lighted on the spot where the dead body was kept and then depart to their homes.

Before returning from the cremation grounds, alms are distributed to the poor according to the means of the family.

This is the more ceremonious form; the poorer classes accomplish the same but without the same formality, buying the wood and other materials, and hiring the services, at the gate to the grounds, where an active business is maintained at all times. Near the entrance, processions rapidly succeed each other, giving way in the streets for the passage of carriages. Frequently you will meet parents bearing the forms of little children without much ceremony and no procession, to the same destination.

Permission has to be obtained to go inside these inclosures.

The Parsees, next to the Hindoos, hold the most important position on the Island of Bombay.

At the present day they form a class of rich and active men, full of devotion to the English rule, and to whom the present prosperity of the island is in a great degree owing.

English is now of habitual use with them. Their wives and

children speak it, and it will probably one day be their national language.

But this brief account is to arrive at the point of telling how the Parsees dispose of their dead.

On the northeast coast of Malabar Hill are situated the famous "Towers of Silence." From the Gowalia Tank Road towards the north a winding avenue leads to the gateway at the top, on which is an inscription that none but Parsees may enter there. Permission had long before been secured for our admission, and our hotel-keeper, quite a prominent Parsee, acted as our guide.

After passing the portals we found ourselves in a small courtyard, from which you could only advance by mounting half a dozen steps. On the right is the "Suggree," a low stone building open on all sides, in which prayers are offered for the dead.

The object of having the court-yard lower than the level on which the Suggree stands is to prevent the ceremonies from being profaned by the gaze of unbelieving eyes.

When the mourners are numerous they group themselves around the building, and as it is open they can see all that goes on within and take part in the prayers.

The dead are never taken into the Suggree. Passing this building we enter a beautiful garden ablaze with flowers; along the walks are iron garden seats of European design and make. Beyond the garden on the undulating summit of the hill looking towards Malabar Point is the parklike, grass-covered tract in which at irregular intervals are the "Towers of Silence" where the dead are laid. The Towers, of which there are six, are round and about thirty or forty feet high and about fifteen feet in diameter. They are solidly built of stone, the walls being some three feet thick, and they are all colored white.

There is no window and only one door, which covers a small aperture about a third of the way up. To this aperture access is obtained by a narrow stone causeway, up which the bier-bearers with the dead alone may venture.

So sacred are the Towers that no one except the bearers, who are set apart for the purpose, may approach within thirty paces of them. Inside, on the rock pavement, spaces are marked out on which the dead are placed to await the vultures, and pathways are marked out for the bearers to walk upon without defiling the place where their unconscious burdens are to rest. "When a Parsee dies his soul goes to heaven, or elsewhere, according as he has

spent a holy or wicked life ; but his body must not be tainted by corruption. It is therefore forthwith washed and purified, and if there yet be time, it is at once carried to the Towers before sunset. If not, it is kept until the early morning. Having been rendered undefiled, it is clothed in white and prayers are offered at the house by the family and friends. None may henceforth touch it ; it is pure and must remain so. The women of the family take a last look, and the light bier, on which it has been placed, being covered with a white shroud, it is carried by the bearers to the hill. No vehicle can on any account be used ; no one must even follow in a vehicle ; the whole journey, no matter what the distance, must be made on foot. All who form part of the cortege must have been washed and purified and clothed in white, and to touch any one would be to become defiled. The women sometimes wear mourning, black ; but the men do not wear mourning. No woman attends a funeral ; the female relatives always remain at home that day, but they may and do go to the Towers afterwards to pray.

“ Following the bier-bearers in procession, those forming the cortege wind their way slowly, holding scarfs passed from one to the other, to the foot of the steps leading to Malabar Hill. Ascending these and after reaching the crest, the priests go through the sacred ceremonies in the Suggree. When the prayers are over the body is borne to the causeway leading to the door of one of the Towers. Here the face is uncovered that all may take a last look ; it is covered again, and the form disappears into the Tower. Outside of the lofty wall which surrounds the space occupied by the Towers are hundreds of acres of land, partially cultivated, which the Parsees own, and which they have carefully kept as a sort of neutral territory between the domain of outsiders and that of the Towers, so that it is entirely secluded from sight. Some hundreds of vultures make their abode in the lofty palms within the inclosure, and when the body is deposited they swoop down and do not rise again until all the flesh has disappeared.

“ In a few hours nothing of the body remains but the bones. When all is over the vultures come to the top of the Towers and remain there for hours without moving, then they take their heavy flight to the palms around ; seldom do they go beyond the trees in the rough ground outside the vast compound.”

There is nothing of a sacred character ascribed to these ob-

scene but useful birds. They are regarded simply as a means of preventing decomposition, and in accomplishing that task they perfectly succeed. In consequence the grounds about the Towers have nothing of the hideous taint of the charnel house. There is nothing obnoxious to health, and not the faintest disagreeable odor to mingle with the perfume of the roses blooming around.

Turning from these sombre details the most magnificent view of the island bursts upon you as you stand upon the Suggree steps and look across the bay beyond. The white walls of innumerable bungalows and public buildings gleam upwards through a forest of palm trees. Beyond rise majestic elephants and other mountain islands; while high over all is the clear sky, which permits all to be seen as through a glass of power.

During this period of sight-seeing and social festivities, we were providing ourselves with the necessary outfit to take with us to the northern part of India, where we were to join the army in the field.

The thermometer at this time, last days of December, ranged from 85° to 92° Fahrenheit, which made the lightest of summer clothing indispensable. As we traveled north, and during the middle of the day while in the field, the weather was generally cool and pleasant. In the evenings and mornings camp-fires were quite necessary.

Large India helmets for ordinary wear, with a "puggree" wound around the base of the crown, was the first essential purchase advised. For the field, and when under arms, our white helmets (we had taken ours with us) made us, the American representatives, quite in uniform with the English; in fact our helmet is copied almost directly from the English. They, however, wear the spike and chain, the latter under the chin, and in these particulars only were we different from them.

We were the only representatives, except the Russians, who wear a cap with a linen cover and a Havelock cape in the field, that were provided with a uniform head-gear for a warm climate. Many, if not all of the others, purchased the English white helmet, upon which some of them placed their own mountings, and with the Germans this made the helmet very heavy; others wore them without ornament.

Our last night in Bombay was passed most pleasantly at a dinner given by Lord Reay, the Governor of the Bombay Presidency, previously referred to, after which we attended a ball given

in our honor at the Bombay Yacht Club. From this ball we went direct to the railway station to take our special train for Delhi.

We left Bombay at 2 A. M., January 1st, by special train of ten cars for Delhi, via Baroda, Surât, Ajmer and Jeypore. Each car was divided into two compartments, each for the accommodation of four persons; on this occasion but two persons occupied each compartment, the representatives of each country having a compartment to themselves. There was a door communicating between the compartments, the Russian representatives occupying the compartment adjoining ours throughout our railroad journeys in India. The compartments were conveniently arranged, with numerous racks and shelves, sufficient for all small parcels, and a small toilet room at the end of each. Four cushioned seats upon which the lower beds were made parallel to the car, the upper bed being suspended to the side of the car during the day. The cars are well ventilated, and during hot weather the slat-work on the sides near the junction with the top of the car is covered with matting, which is kept wet and by evaporation keeps the inside of the car cool. Several important places are passed on the road, Surât-Broach, a place of much commercial importance and principal point for cotton export. There is a very fine railroad bridge, 25 spans of 180 feet spans, that here crosses the Nerbudda, a river regarded by the Hindoos as the most sacred, the mere sight of which imparts purity, and its sanctity lasts forever; Baroda and Ahmedabâd, the latter an important place of 130,000 inhabitants and the headquarters of the northern division of the Bombay Army.

At Ajmer we left the train for a few hours, and took breakfast at an English club, by which an invitation had been extended to us while *en route*.

Ajmer is one of the principal towns in Râjpootâna, one of the native states or districts in India. It is a very striking city of great antiquity and celebrity. It is situated on the slopes of a valley surrounded by rocky hills, and the town is surrounded by a stone wall with five lofty gateways. We drove after breakfast to Lake Aunâ Sagar, a short distance from the city. The lake is fringed by the Native Government courts and other buildings which are occupied in the warm weather.

We enjoyed the rest here after the railway journey. Jeypore, our next stopping place, is one of the interesting places in India.

This city is entirely under the government of a native prince with an English Resident. The prince is considered a most enlightened man, as he has gas lamps in his streets, which is pointed out to you as an evidence of high European civilization.

We visited the School of Arts and Industry, in which the Mâhârajah takes a great interest. We saw the collection of articles that were to be sent to the Colonial Exhibition in London, also the special work in which Jeypore excels, viz., enameled jewelry, which was very beautiful but expensive, also the carved figures in soap stone; visited the mint and zoological gardens, and a private collection of tigers, many of them being distinguished man-eaters; they were confined in cages at the foot of a public street, in the midst of half naked children running about in reach of the beasts. The cages were apparently of such temporary construction that at every plunge of the beasts against them you thought they would surely give way.

We visited the palace, but on account of indisposition did not have an audience with the prince. The palace seems to embrace one-third of the city within its walls—beggars, soldiers, politicians, priests, and all manner of human beings who live on the royal bounty.

We climbed to the highest top of the palace, from which you obtain a beautiful view of the surrounding country, and the gardens of the palace, said to be the most beautiful in India. We saw no signs of the household; information is generally conveyed of the approach of Europeans, upon which the ladies pass into seclusion.

The prince has a dozen wives, I believe, and it is the boast that no Râjput princess has ever been gazed upon by profane European eyes.

The Mâhârajah has many distinguished titles, among others Ram Singh, by which he is commonly known. He is also Knight Commander of the most exalted Order of the Star of India. He is entitled to and receives when visiting any province, English or native, a salute of twenty-one guns, the highest salute given to any Indian prince.

In the way of good blood and long descent, this prince traces his line back more than one thousand years, and then rises into the heavens and claims the universe among his progenitors. This is from the fact that his line claims descent from the great mythological character Râmâyana.

This prince is very friendly to the English rule, and is a member of the Legislative Council of the Viceroy.

His state embraces about 15,000 square miles, population about 2,000,000, and a revenue about \$2,225,000. About \$200,000 is spent on public works yearly.

We visited the private stables, saw a number of handsome Arabian horses, and on the riding ground several of them performed various tricks with their trainers for our amusement.

The ancient city of Amber is some few miles distant from Jeypore. The former residence of the Mâhârajah is located there. It is a place of great antiquity and beauty, but we did not have time to visit it. After completing such of the sight-seeing as I have mentioned, we were driven to our hotel accompanied by our escort of native troopers, by whom we were received at the station on our arrival in the morning. Here we found the merchants from the bazaars sitting on their haunches on the green, in front, and by the roadside, waiting our return to display their various articles of armor, knives, jewelry, silver, etc., etc.

If there is one thing an Indian can do with patience, it is to wait; information of the arrival of a European in any town, soon spreads among the bazaars, and your hotel and the grounds about swarm with them as long as you remain, hoping to catch an encouraging glance from your eye, and an opportunity to display their wares. Those who have had experience in making purchases in certain parts of Europe or in Constantinople, will readily understand that there is no such thing as a fixed price for any article, and that unless the article is secured at less than one-half of the original price asked for it, though of course the family will be impoverished, the children have nothing to wear, etc., you are probably badly cheated.

We arrived at Delhi on the morning of January 3d, and were met at the station by the other officers, mentioned before, who were detailed to accompany us, and with a small escort of the 17th Lancers, drove to the camp of His Excellency Sir Frederick Roberts, Commander-in-chief. The camp was located some two miles north of Delhi, and just beyond the historic "Ridge."

This escort of the 17th Lancers were the first English troopers we had seen in India, and I was instantly attracted by their soldierly bearing and horsemanship, which they had an opportunity of showing, owing to the noise and confusion upon the arrival of the train at the station, and the screeching of the engine whistles.

There were but few of them, all were young men, bright faces, cleanly shaved, good figures, tight fitting jackets, and sat their horses while at rest and when at the trot as though part of the animal, but without rigidity; I recognized at once the instruction that these men had received as identical with our own. Later, when I came to know the 17th Lancers, which by the way is one of the "swagger" regiments of the English Service, and by whom we were most hospitably entertained upon our visit at a later period to their station at Lucknow, I found that the riding master of the regiment, who has the rank of captain, was perfectly familiar with our tactics and method of instruction, and had adopted many features of it in his instruction. This officer had frequently been in the United States while serving in Canada. Let me state here that the English troopers that I have seen more or less of, viz., the Lancers, Hussars and Dragoon Guards, do not rise in their stirrups, bending the body, wriggling backward and forward with the motion of the horse, as you see in Rotten Row, and perhaps with some of the Guard regiments about London; a contrary opinion I know prevails. Upon arrival in camp, each representative was assigned a large, commodious tent, one tent as it were pitched over the others, with air spaces four or five feet between the sides and tops; aside from this, these side passages were very convenient for servants to pass in and through the tent without going through the centre. The interior of the tent was further divided by canvas curtains into sleeping and dressing apartments, etc. Our tents adjoined the headquarters staff, but grouped together and designated, "Foreign Officers Camp." In front of each tent was a small flag of the country that each represented, and the name of the occupant painted in distinct letters upon a board about two feet long, suspended at the side of the entrance to the tent.

Each tent was supplied with all necessary comforts and conveniences, beds, bedding, a coarse carpet on the ground, printed rules and regulations of the camp, with diagram and directory of the same, hours of arrival and departure of mails, postal rules, maps, plans and all information of the future operation of the two armies. In each tent was a chimney and fire-place, for in the mornings and evenings a fire was necessary in this latitude and at this season of the year. We also had in our camp, centrally located, a large reception tent, which was comfortably furnished; soft rugs under feet, the walls and top sides hung with "phool

karries" (silk and worsted embroideries) and cashmere embroideries in silver, upholstered sofas and chairs, writing tables, latest newspapers from all parts of India and London, piano, etc. Adjoining this tent and connected with it by covered passage way was the mess tent, in which forty persons or more could be seated with comfort.

The afternoon of our arrival we officially called upon General Sir Frederick Roberts, and were received by him in his headquarters tent, with his entire staff, British and native, all in full uniform.

That evening we dined with the Commander-in-chief, and with some forty or more officers, several ladies and prominent civilians. There were a number of ladies and gentlemen in Sir Frederick's camp as his guests.

A reception followed the dinner, at which we met many of the prominent officers of the Southern Army, which army had reached the day before a point some three miles north of the camp, in their march from Guargaon, some twenty miles south of Delhi, where the brigade, divisional and inter-divisional manœuvres had been taking place the previous two or three weeks. The foreign representatives were invited only to witness the manœuvres under the 4th period, which was that of the "two armies manœuvring one against the other." These armies were separated at the beginning of the manœuvres by a distance of 125 miles. The line of concentration of the northern force being north of the line Umballa and Pathiala, that of the southern force being south of the line Googaon and Farcedabad.

The next day we spent in selecting horses and making other arrangements for taking the field, repacking baggage and selecting only such necessary clothing as would be required for the field, and of it we were only to take *field* allowance. The 9th Lancers had been dismounted and returned to England a short time before our arrival, and the horses of one troop of this regiment had been reserved for our use. They were "Walers" and, generally speaking, well trained to the bridle and in other respects for active service, being good jumpers, active, nimble and full of life. We each had two horses, with two "syces," or grooms, who followed unwearied all day with a blanket over his arm, and whenever we would dismount for luncheon or other purpose there would appear this "syce" to hold and cover the horse. It was a mystery to me how they could follow and

keep track of us in the midst of twenty to forty thousand troops.

I was fortunate in selecting two good horses, and afterwards had reason to congratulate myself that I had availed myself of the permission to select our mounts, which all the representatives did not do, and I expect had reason to regret it afterwards, as several were badly knocked up by the severe riding at times, which was generally ascribed to the bad gaits of the horses. I anticipated what was coming and knew that we would have to follow officers unused to the field and accustomed to cross country riding. I was the junior in rank of all the foreign representatives, though not the junior in age, so it was a matter of pride with me that I should at least keep up, and be found with the rest of the staff at the close of the day's operation.

The following incident, though strictly belonging to a paper that will follow this, I will mention here, confirming a judgment I had formed some years ago while instructor in tactics at the Military Academy, against the present method in use in our Service for supporting or carrying the sabre from the waist when mounted and during rapid gaits. I wore while in India a light artillery sabre. Yes! I know I am not a mounted officer, but I had permission; I foresaw in what a sorry plight I would find myself among the representatives of the armies of Europe, and though an *Artillery* officer not allowed by regulation to wear spurs, top boots or a mounted officer's sword; I explained this to the Adjutant-General and obtained authority during this special service to wear mounted equipments. Upon going into the field I was careful to secure my sabre to the scabbard, knowing by experience that it was quite liable to jump out during rapid gaits. It was during a rapid gallop the second day out, the weight of the sabre tugging at my waist at every bound of the horse, and when not swinging in the air nearly at the height of my head, was beating the sides and flanks of the animal that the miserable metal snappers, by which the rings of the scabbard are attached to the straps of the belt, gave way or opened, and away went my sabre, much to my mortification. I never found it, though I returned after going some little distance, to as near the spot as I could determine.

Fortunately one of the Russian officers was able to furnish me with an extra sword he had, which answered all purposes while in the field. Sir Frederick Roberts, who had learned of

my mishap, had most considerately sent to Calcutta for a sabre, which he presented to me on our return to the permanent camp at Delhi, thus giving me another evidence of the many we had received of the thoughtful attention and kind-hearted character of that distinguished gentleman and soldier.

The sword or sabre, when mounted, should be carried either in a frog attached to a strap passing over the shoulder and under a belt at the waist; this supports the weight of the sabre from the shoulder and keeps it reasonably close to the side, or else the sabre should be entirely detached from the person and suspended in a frog attached to the skirt of the saddle, or front part of the saddle.

The weight of the sabre with the scabbard is very considerable to be borne at the waist when moving faster than a walk. If the sabre is drawn, of course, the weight is not so material, but the sabre is not ordinarily drawn except in actual engagement or on occasions of ceremony.

To continue. We were supplied with maps of the country, and with the organization and strength of each army, and with the problem and general scheme of operations upon which the two armies would manœuvre.

We left camp early in the morning of the 5th of January; the first ten or twelve miles or until luncheon, was made in open carriages. After luncheon we took "tongas," the two-wheeled, low, heavy covered native or country wagons, drawn by two horses, the tongue supported by a curved cross-bar resting upon the back of the horses, similar to a Roman chariot, and over rough roads it is a beastly, uncomfortable thing to ride in. It is universally used on the great highways for making journeys over India; of course, no one travels in that manner but officials. The driver uses a copper bugle which announces the approach to villages and tedious trains to make way for it to pass. That evening we overtook the army moving northward, and remained either with the Southern or Northern Army for the next two weeks, depending entirely and living in our flying camp. Each representative in the field was provided with a tent about the size of our wall tent, a small canvas camp bed, a common rug for the ground, two blankets, a pillow, small folding table, rubber bath-tub, etc., and one body servant.

The full mess equipment accompanied us in the field, and every night we had a large dinner party; the prominent officers,

with a certain number of their staffs, of the army with which we happened to be camping for the night being invited, and in this wise we met nearly every officer of prominence in the two army corps of forty thousand men.

Our table was supplied entirely with such food as only could be got from Europe, and as this had to come from Bombay, I can conceive that the daily marketing was no easy matter. There was daily communication for mail, etc., kept up between our flying and permanent camps.

These dinners were entirely informal; all were in undress uniform, and in the best of spirits, no speeches, the terror of those who cannot make one, awaiting you at the end of the dinner, rarely any discussion, never any criticism of the days' operation, and the one incident which always impressed me, and for which for the nonce quieted everything, and that was the toast, which is always drunk, and which I described in a previous paper. In the midst of the clatter, laughter and noise, and upon intimation, all would rise with glasses in hand, perfect quietness prevailing, then as one voice—"To the Queen, God bless her," and the glasses would be emptied, all would remain standing a few seconds, while the band played the first bar of the national anthem, seats would be resumed, conversation taken up and cigars and coffee brought in. I could occupy much time, if I dared, to begin to name the many prominent officers we met on these occasions, many of whom are identified with the history and development of India, and bearing the names of those who in other times were conspicuous and distinguished. It is a striking fact, that you find the descendants of many of those who were prominent in former periods, now in the military or civil service of the Government, and to which they are mostly devotedly attached. Not to mention many, the following are a few names that occur to me—Lawrence, Gough, Chamberlain, Dillon, MacGregor; General Sir Charles MacGregor, was a conspicuous figure among these, a man of almost colossal figure, genial countenance, commanding presence, and endowed with much ability, I never met him but I thought of the lines of Macdonald—"Where MacGregor sits there's the head of the table." General MacGregor was at this time commanding an infantry division of the Southern Army, and only a short time before had been Quartermaster-General of India. Do you realize what I say? A few months before he had charge of the important staff and supply department of the Army, and now

was commanding a *division in the field*. Similarly, the present Adjutant-General of the Army in India, Sir Thomas Baker, enjoying the local rank and pay of a major-general, was but a few months before in command of a brigade. These staff positions, and the command of troops are held for five years. This is a prominent feature of the Military Service in India, the lessons of which I think are most applicable to our small Army. I reserve a fuller explanation of the working of this system and similar professional topics for another paper. All branches of the Service were represented on these occasions. Except among the higher grades, my own branch of the Service was not so often met, these though I would personally seek, and I have the liveliest recollection of their cordial hospitality, as we sat around their own camp fires in the evening and discussed the business of "gunners," as the artillery is called in the English Service, and with me this was admissible, as I was not considered a foreigner in the sense that other representatives might have been. As a body they are a thoroughly trained, high spirited class of men, and of all the batteries represented in the two army corps, I don't believe there was an officer in command of a battery over 43 years of age.

There was intense enthusiasm in this branch of the Service, which was thoroughly aroused on this occasion, for Sir Frederick Roberts himself was a "gunner."

The engineer officers I remember also as agreeable and accomplished men, and notwithstanding the prodigious labors they are called upon to perform in the various civil works of the Government, they are very ambitious and proud to command troops in the field, and just at that time were enjoying the gratification of the successful conquest of Burma by a force under the command of General Mackenzie, an *Engineer* officer. These officers were familiar with the accomplishment of many civil-engineering problems in our country, notably Hell Gate, and were familiar with the names of Newton and "Eads."

The medical officers were unstinted in their praise of our surgeon-general's office, in the production of the Surgical History of the Rebellion; and all officers recognized and appreciated the dash and enduring qualities of our cavalry and infantry in their Indian campaigns, and claimed that there was a bond of sympathy between the two Services in the character of the barbarous enemies that each had to contend with.

And now under the division of the subject as I have arranged,

we will leave the Army here and take up the narrative after our return to the permanent camp at Delhi about the middle of January.

Lord Dufferin, accompanied by his daughter, Lady Blackwood, and the military members of his staff, arrived in camp from Calcutta the evening after our return, to be present at the grand review of the two army corps which was to take place in a few days.

In the afternoon following we paid our respects in full uniform, to His Excellency, who received us alphabetically by the nations we represented, the informal welcome lasting some fifteen or twenty minutes for each party, no one else being present except the Commander-in-chief, Sir Frederick Roberts, and one aide-de-camp.

During Lord Dufferin's service as Governor-General of Canada he had frequently been in the United States, and had been the recipient of many kind attentions from our people, to which he pleasantly referred on several occasions.

His charming, affable and most pleasing manners made a most favorable impression upon all the representatives, and in a characteristic speech delivered the following day, showed that there is perhaps no statesman of modern times who has had a more extended experience in foreign countries, or is more fitted to receive representatives of the different nations of the world. His familiarity with the customs and pleasant associations connected with each one's country made all feel entirely at ease in his presence.

At a formal breakfast the following morning in the foreign officers' camp, at which Sir Frederick and many prominent officers and civilians were present, the Viceroy made the following remarks welcoming the foreign representatives to India. At that time the Viceroy thought he would be unable to receive in person the foreign officers at Calcutta, the seat of government, on account of his proposed trip to Burma. This trip was, however, deferred a few days so that he might do us the honor of a ball, and on another evening a formal dinner, both of which will be referred to in its proper place in this narrative.

The following were his Lordship's remarks :

Ladies and Gentlemen: As this I fear is the only opportunity I shall have of doing so, I hope I may venture in the name of the Government of India to express how highly we consider

ourselves honored by the presence of these European officers who have come from so great a distance to witness the military manœuvres in which so considerable a portion of Her Majesty's forces in India, both British and native, have lately been engaged.

On behalf of my colleagues, and as the representative of the Queen-Empress in this country, I now bid them most heartily welcome.

All are distinguished representatives of the respective armies to which they severally belong, and I have no doubt we shall derive very great profit from such observation and criticisms as may have occurred to them. But not only do I desire to welcome them as the head of the Indian Government, I also wish to express my great personal satisfaction at receiving them in our midst. It so happens that there is not one amongst them to whom had he come as an ordinary traveller I should not have felt bound to show special courtesy and attention.

For instance, there is Prince Esterhazy, from whose grandfather at an early period of life I experienced great personal kindness, and who has received his mission here at the hands of Count Kalnoky, the Austrian minister of foreign affairs, who was an intimate friend and colleague of my own at St. Petersburg. In company with Count Kalnoky, I was permitted to be a spectator of Russia's annual great manœuvres, when I had ample opportunity of appreciating the splendid and gallant appearance and of noting the men and officers of the Imperial Russian Army, as well as of receiving most considerable kindness at the hands of His Majesty the Emperor. Not only so, but one of the Russian officers present wears the uniform of the regiment, who were good enough, when we left St. Petersburg to depute some of their number to say farewell to Lady Dufferin at the station, when they almost smothered her with bouquets.

Again, I see opposite to me two officers representing the most venerable and one of the mightiest of European monarchs; through accidental circumstances during a period of thirty years I have experienced from time to time at the hands of the Emperor of Germany repeated marks of his never-failing urbanity and goodness of heart, and I hope that when the representatives of the German Army return to their native land they will lay my respectful homage at the feet of their sovereign and assure His Majesty of the unspeakable pleasure it has given me to show them whatever attention lay in my power.

On my left I am honored by the presence of the representatives of the French Army. One of them is well known to be more respected and universally liked in London than any one who has occupied a similar position. His colleague is an old acquaintance and both represent a country with most of whose distinguished statesmen and generals I have had the good fortune to be upon terms of intimacy. We have also many friends in common. To extend to these two officers my most respectful greetings is naturally, therefore, a labor of love. With the officers who came from Italy I can boast no personal acquaintance, and yet probably I am united in sympathy by far stronger ties than they themselves suspect—though an Englishman, or rather an Irishman, by profession, by birth I am Italian, and I never hear their beautiful language spoken without its recalling many agreeable memories. They can, therefore, well understand how pleasant it has been to me to welcome them to India.

Again, on the other side are two other officers whose presence here is as grateful to my feelings as that of any of their colleagues, inasmuch as they represent the Army of the United States, a country which I had often an occasion to visit when Governor-General of Canada, and whose border I never passed without experiencing at the hands of its inhabitants such an amount of kindness and hospitality as it would be impossible for me to forget. If, therefore, I have ever found myself in the midst of any company whose presence I should welcome it is that of these distinguished officers now present at the table. At the same time there is one consideration which perhaps mars the harmony of my greetings, as the followers of the profession of arms, it is the duty of our military visitors to bring to the utmost efficiency those means of mutual destruction to which nations are forced to appeal in the last resort. Now it has been my duty, as a diplomatist for several years, to apply whatever faculties I am possessed of to rendering those armies whose organization they are so eager to bring to perfection, as inoperative as possible.

Wars are the reproach and disgrace of diplomatists, whose ambition should be the reverse of that of our military friends, namely, to render War a lost and forgotten art.

Unfortunately, hitherto the soldiers have too often got the better of us, but whatever my professional instincts might have been as an ambassador, I am free to confess that as Governor-General of this country my desire for the maintenance of peace has been

still further intensified, and most heartily do I pray that the wisdom of all our governments and the calmness and moderation of public opinion in the various countries of the world may confine the efforts of all nations to such mimic warfare as that which you gentlemen have lately witnessed on the plains of India, and that in Asia, as in Europe, the beneficent triumphs of civilization may never be marred or interrupted by the terrible necessities of War. In conclusion, I have only to express my regret that my proximate voyage to Burma will prevent me from entertaining our foreign visitors in Calcutta as I should desire. If they will permit, however, I will commission my daughter to welcome them to Government House in Lady Dufferin's name and my own and give a ball to their honor, in order that they may have an opportunity of convincing themselves how favorable is our climate to feminine beauty; that our ladies' eyes are more fatal than our artillery, their wit more pointed than our bayonets, and that they are ready to give them as kind, though perhaps a more dangerous welcome to the capital of India, as that which we have endeavored to extend to them in our camp at Delhi. And now, ladies and gentlemen, I beg to propose the health of the emperors, kings and chiefs of states of the countries whose officers have done us the honor of visiting India.

The day following the foreign officers, with prominent officers from both armies—the Northern and Southern armies were united near Delhi—were invited by Sir Frederick to witness some experiments then being carried on with an armed train of cars. I see the results of these experiments are now published in a recent number of the *Proceedings Royal Artillery Institution*. I find among my notes, though, that the train was not complete at this time, being armed with only a 40-pounder Armstrong, old pattern, and two Nordenfeldts. The train was run out of the city a few miles, and the 40-pounder discharged a few times at a target located in the Jumna River. The successful working of armed trains in Egypt, during a previous campaign there, had probably suggested the idea of their adoption in India, particularly for transporting troops. I will not weary you with detailed notes upon this, as the experiments had not been completed and no conclusion arrived at. Personally I was not impressed with the necessity of providing an armed train for such heavy guns as the 40-pounders, and for field and machine guns we had developed the idea quite freely during the Rebellion.

In the afternoon we made formal calls upon the Mâhârajahs of Bhutpore and Gwalior; the latter had accompanied the Southern Army in the field, in which army he had a small contingent, he was always visible in a separate part of the field during the exciting contests, with his elephants, retinue of servants and small body-guard, and frequently camped near us. It was said he was quite a soldier and took much interest in the manœuvres. We were received with much ceremony by him, his ministers standing on one side of the tent, muttering welcomes accompanied by profuse salaams as we entered. After being presented in turn we took seats, the Rajah's officials sitting opposite, picturesquely attired in colored silks, and some of them literally glistening with precious stones.

The usual dead silence reigned, Colonel Upperton being the only one near enough or who could talk with the Mâhârajah, of course, they knew no language but their own; after a few minutes we formally took our leave, Colonel Anderson, an English officer on duty with the Mâhârajah, and who commanded all the native troops in the contest a few days before near Delhi, and for which he received much praise for the manner in which it was performed, made all arrangements for these visits. Scindia of Gwalior stood very high in the estimation of the Government of India, and ruled over the most important native State. Lord Dufferin had but a few months before restored to this prince, with much ceremony, and in the presence of the leading native princes of India, his native stronghold and fortress of Gwalior, *as promised him* by the English Government many years before, for his subsequent loyalty and fidelity. This prince has since died, and a valuable treasure of many millions of rupees has been found buried near his palace. The English Government has borrowed it, for which they pay a certain interest during the minority of his successor.

The next day a few of us accepted an invitation to make the tour of the "Ridge," and listen to the story of the siege of Delhi during the great mutiny, as told and explained by two participants in that siege, who were subalterns all that time—Colonel A. E. Perkins, R.E. A.D.C. to the Queen, and Colonel Minto Elliott, R. A., Adjutant-General of Artillery for India. Many explanations and locations were pointed out in going over the ground, which could not be gained otherwise; I enjoyed the privilege and instruction very much.

January 19th, a day or so after the above events, was the day appointed for the Grand Review or "March Past," as it is called in the English regulations, in which His Excellency the Viceroy would review the troops previous to their departure for their stations throughout Northern India, opportunity being taken of this occasion for the usual change of stations, which takes place among some of the troops every year.

The review commenced at 11 A. M. on ground some five miles from Delhi, and where the Prince of Wales reviewed a portion of the Indian Army in 1876. The review was unfortunately marred by heavy and continuous rain during the entire day. The Viceroy, attended by the Commander-in-chief with staff and foreign officers, rode down the line at 11 A. M., all officers saluting with the hand, the British colors carried by each regiment or organization as we passed. I was impressed with the attention paid to the saluting of the colors by officers on all occasions and under all circumstances when passing, a fact which I think we might pay a little more attention to; if I may be excused a slight digression here, I have been surprised when travelling in Europe and the East on other occasions to see the manner in which the American flag is permitted to be used as an advertisement, and in Hong Kong, while looking for the American Consulate, I was attracted to a place over which floated a beautiful new American flag forty feet long, perhaps, on an immense pole, which I thought surely must be the consulate, but which I found was a groggery and sailors' boarding house. I have never seen the flags of other countries used for such purposes.

The following is the order in which the procession passed down the line,—if you will pardon my giving these details, which you do not find laid down in the books, and surely nowhere in our regulations do you find any guide for a similar occasion or ceremony: Captain Gartside-Tipping, quartermaster of the camp, an officer of the intelligence department leading, followed by a detachment of the Viceroy's body-guard: the aides-de-camp of the Viceroy and Commander-in-chief; the staff of the Commander-in-chief inversely according to rank; the Viceroy and Commander-in-chief; the Governors and Lieut.-Governors of the Presidencies and Provinces present on the occasion; Lord William Beresford, military secretary to the Viceroy; foreign officers and general officers not in command of troops; officers of the Umpire staff under the rank of brigadier-general; personal staff

of Governors and general officers and the volunteer delegates. The escort of the Commander-in-chief, the 17th Lancers, closing the procession.

The total force reviewed on this occasion, of all ranks, was over 35,000, being 15 regiments of cavalry, 20 batteries of artillery, 38 battalions of infantry, including one volunteer battalion, and 4 regiments of cavalry, 5 batteries of artillery, and 5 regiments of infantry from the native states of Cashmere, Pattiala, Jheend and Nabha. There were 130 guns, 9,000 horses nearly, 500 mules, 300 bullocks and 25 elephants. The line was 3,000 yards long, and took more than an hour to pass around; the rain pouring furiously all the time, drenching impartially the Viceroy, the distinguished generals, staff and foreign officers; many beautiful uniforms were ruined on that day. The troops were formed in two lines, the infantry in front in line of quarter columns of double companies; in the second line, the Royal Horse Artillery on the right with the cavalry, and field, mountain and elephant batteries on their left, in the order named; the artillery in line of batteries at half intervals, and the cavalry in quarter columns. After completing the inspection, the Viceroy, accompanied by his staff, foreign officers and escort, returned to the flag-staff, which marked the point opposite the centre of the line, and sufficiently far from the line for the "march past" to be executed. The foreign officers on the right and rear of the Viceroy, the staff of the latter directly in his rear.

In rear of the reviewing party was the Viceroy's body-guard and Commander-in-chief's escort. The massed bands of the different corps were opposite the reviewing point, and at sufficient distance to permit the column to pass between them and the Viceroy. The bands did not accompany or lead the troops, but took up the cadence as the head of the column approached the saluting point, and at 200 yards distance therefrom. The bands exchanged and played for the marching past of their own organizations.

The Commander-in-chief and generals commanding separate army corps *only*, with *one* side turned out of the column after saluting, and placed themselves alongside the Viceroy, the aides in rear of the Viceroy. The other general officers, with their staffs, wheeled out of column after saluting, and took post on the opposite side of line of march, facing the Viceroy, until their commands had passed.

The march commenced first with the Northern Army, then the

Southern Army and Native Contingent. The order of march was horse artillery and cavalry by brigades; field, mule and elephant batteries by batteries; the sappers and miners by companies, and the infantry by divisions and brigades. The artillery in column of batteries at closed intervals (wheel to wheel nearly), the cavalry in column of squadrons, and the infantry in column of double companies.

General Sir Frederick Roberts, Commander-in-chief, *preceded* by Army headquarters staff, led the column, which was more than two hours in passing, the rain at intervals pouring down in torrents, which after the mounted troops had passed, had reduced the ground in front of the saluting point to mud more than ankle deep, which made the marching for the foot troops very difficult indeed, and particularly for the Native troops, all of which are not equipped with the ordnance boot, but wear a light-pointed low shoe, not unlike a slipper, turned up at the toe and heel, and with no fastening to the foot; never intended for thick mud. Many of these shoes pulled off just in front of the Viceroy, where the mud was the deepest, and could not be avoided. The men, rather than lose their shoes, which possess a value to them, fell out of ranks and picked them up. This ludicrous feature, to a certain extent, broke up the perfect alignment of some of the subdivisions just at this point. This equipment of the native soldiers is undoubtedly defective, and I can't conceive of a more thoroughly satisfactory way of bringing it to the notice of the authorities than on an occasion of this kind. It will, no doubt, receive early correction. After marching past, as above, the infantry reformed on the original line, and the cavalry and artillery trotted past in same order. On account of the rain and mud the passage of the horse artillery and cavalry at a gallop was dispensed with. The troops then reformed on the original line, when the whole force of 36,000 men, etc., advanced to the front some hundred yards or more, with bands playing. The line halted, the Viceroy, staff, foreign officers, etc., rode forward and were received with a present arms and royal salute of artillery. The Viceroy addressed a few words to the Army, which could be heard of course, only by the few near him. His remarks were published to each regiment the following day. He expressed his entire appreciation of their splendid fitness and soldierly appearance under the disadvantageous circumstances, etc., etc.

This terminated the review ; the troops were marched to their respective camps some few miles distant, and we galloped to our camp some four or five miles away for dry clothing and something to eat. Without entering into a detailed criticism, I find I noted the following : The perfect steadiness, smartness (in the English sense) and admirable turnout of the artillery on this occasion. Though the horses slipped badly in the mud, yet a perfect alignment in line of batteries was preserved *at all gaits*, and at the trot not a horse in any battery was out of gait, all keeping time with the music. The cavalry was creditable, notably the 8th Hussars, Col. Langtry's Regiment, the 10th Bengal Lancers, the 18th Bengal Cavalry and the Central India Horse. Of the infantry, the Highland Light Infantry, the Seaforth Highlanders, who wore kilts, the Sikh and Goorkha regiments impressed me most favorably by their marching.

In the evening the Commander-in-chief gave a reception, to meet the Viceroy and foreign officers, all prominent officers and civilians were in attendance, notwithstanding the rain, which still continued during the night.

The Viceroy was present, much to my surprise, considering what he had been through during the day, mounted upon his horse all day in the rain, dressed in a thin black frock coat, light trousers and black silk dress hat; would permit no other covering while the troops were passing, though drenched with the rain. His family was most anxious concerning him, as he had just risen from a sick bed to be present on this occasion, and as he had to ride several miles in the rain and at night, I thought it a marked compliment to the occasion that he should have again appeared.

Early the next morning the Viceroy took his departure for Calcutta. His leaving was attended with the usual ceremonies, the entire distance of the road traversed by His Excellency from the quarters he had occupied to the railway station, was lined on both sides by British and Native troops. The Commander-in-chief, his staff, general officers, foreign officers and others were present to say good-bye.

As the Viceroy arrived on the platform a royal salute was fired, followed by the band playing the national anthem, after which cordial adieux were said, and we saw no more of His Excellency until we were received by him at Calcutta some days later.

The next few days were spent in sight-seeing in and about Delhi, and in witnessing various ceremonies, competitions and sports of the troops. Under the patronage and orders of the Commander-in-chief, and a committee of officers designated for the purpose, various sports took place between the men for money prizes as high as \$50.00 each. Mounted sports—Lance *vs.* sword, lance *vs.* lance, sword *vs.* bayonet, etc., etc. Infantry—Bayonet *vs.* bayonet and sword, parallel bars, horizontal bars, British and Native Cavalry—Tent pegging, with lance and sword, lime cutting, tilting at the ring. The prize from the Commander-in-chief for the best tent pegger was a watch.

Artillery driving competition: Prize, entrance money and a watch to No. 1 (chief of Detachment with us) of the winning team R. H. Artillery, and watch to No. 1 of the R. A. team, presented by Commander-in-chief. Entrance fee \$2.00 per team.

This was decided by placing small mounds of earth or sand opposite and a few inches further apart than the width of the wheels of carriage, arranged in the form of a parallelogram. The piece with six horses, cannoneers mounted on the chests, moving *at a gallop* was to pass between these mounds, making all the turns, and returning to the point of starting without touching them. A very difficult thing to do. I saw in this exercise the great advantage of having one of the wheel horses in shafts, where such accuracy of driving is required, and this was the only advantage I could see. In the field this exactness would not be required, and the system has many objections.

Tent pegging, for officers: Prize, entrance money, \$2.00 entrance. Imagine my surprise when I saw Sir Frederick Roberts himself enter for the prize. He rode against two of his young aides, and by the way, won the prize. I doubt if in any army in the world other than the English you would find a general officer commanding an independent army, and of the size of the Indian Army, and at his age, that would risk his reputation for horsemanship in the presence of forty thousand of his troops in a tilt of this kind. He replied to me afterwards in referring to it, that he had been practising in exercises and sports of that kind all his life, here in India. I had had reason, as I said before, to know something of his horsemanship and endurance, in our efforts to keep up with him in his rapid movements from one flank to another during an engagement in the field.

Sir Frederick, I should say, is a man about 55 years of age,

not more than five feet, five or five and a half inches in height, with slight, trim, soldierly figure. He has served all his life in India and the East, and is immensely popular. He is exceedingly courteous, modest and unassuming in his manners and address. He had recently been promoted from Lieut.-General and in command of Madras Army to the Commander-in-chief in India. He will be remembered by us as in command of the Relief Army in 1880, in Afghanistan, and in executing that wonderful march from Cabul to Candahar under Sir Donald Stewart's direction, the latter general, by the way, Sir Frederick relieved as Commander-in-chief in India just before the beginning of these manœuvres that we are talking about.

Sir Frederick had a most efficient, so far as one could judge, and delightful staff about him. Of course, we all know that there is no permanent or fixed staff in the English Service or in India ; all officers are detailed for staff duty and for a period not longer than five years.

His adjutant-general is a lieutenant-colonel of the line, enjoying the local rank and pay, etc., of a major-general while performing this duty.

His quartermaster-general is a major of artillery enjoying the local rank, pay, and of a major-general, and so on.

Many of the younger officers of his staff had seen service with him in Afghanistan—his Chaplain, Rev. Mr. Adams, was a Victoria Cross man, gained while with Sir Frederick in a previous campaign. He was one of the best riders and horsemen on the staff and besides preached a good sermon. Service on Sunday is strictly observed in the English Army, we all know, whether in field or garrison. Several different services were held every Sunday in the field, which officers and soldiers could attend according to their own preferences. The headquarters service of course, is the Episcopal service.

The foreign representatives were duly informed of the hours, place and character of service, that each could attend ; I expressed the intention of attending the Episcopal service in Sir Frederick's camp, upon which one of the Russian officers remarked good naturedly that he thought all good Americans attended the Mormon Church.

Firing competition, for Royal horse and field artillery. This was for a prize of £25, to be devoted to the purchase of a nomination in the corps of Commissionaires for the benefit of

the winning team. It was offered by the Director-General of Ordnance, with the sanction of the Commander-in-chief in India, and was competed for under the following rules or conditions, which it may be of interest to us to know, as we are going to have a light artillery school. I was the only representative of the foreign officers present, as none of the others took much interest in matters of this kind, purely artillery. I ascertained that the competition would take place on ground some five or six miles back in the country, to which place I rode.

Conditions: One subdivision (piece with its caisson) of each horse artillery and field battery, the gun detachment and drivers to be selected from the battery by the major commanding. Four rows of targets (boards) 6 yards apart, each row 120 feet long, 2 feet high, representing the main body of a battalion of infantry in attack formation, were erected at an unknown distance, and the prize to be won by the subdivision making the greatest number of throughs. The competing subdivision to be drawn up at a distance of half a mile from the firing point, and to advance in turn into action, the horse artillery at a gallop, the field artillery at a trot, and to fire ten rounds, provided the limit of time was not exceeded, of shrapnel shell fused with fifteen seconds time fuses. Time allowed, $15\frac{1}{2}$ minutes for horse artillery, and $16\frac{3}{4}$ minutes for field artillery, counting from the moment of starting from the first position, firing to cease on the expiration of the allotted time, whether the whole ten rounds had been expended or not. The range was to be found, if desired, by the battery range takers within the time allowed, or by trial shots of common shells and percussion fuse, but in the latter case these rounds were to be deducted from the maximum number of ten rounds allowed.

A committee of officers were detailed to carry this out. The subdivision to be in "drill order" with all the ammunition, stores, etc., carried in their proper places, no preparation of fuses or tangent scales, etc., being permitted.

The shrapnel shells were filled with 63 bullets each, making a total in the 10 rounds of a possible 630.

The range takers, three men mounted, carrying the Watkins Range Finder, at the signal for the subdivision to advance, move forward at a rapid gallop to the point indicated by a flag, where the piece is to halt and fire. They are supposed to arrive there in sufficient time in advance of the gun to get the range,

but this was not always accomplished, in fact, very little reliance was placed upon this method of getting the range, or of any other range finder yet known that can be conveniently carried, and for this kind of fire. The range was usually determined by trial shots. The first gun only put 15 bullets through the half inch boards, the next put in 65, and so on. The prize was won by B 3 (field battery) making 245 throughs.

THE MILITARY INSTRUCTION OF OUR YOUTH AND CITIZEN SOLDIERS, AND THE USE TO BE MADE OF THE REGULAR ARMY IN ACCOM- PLISHING THIS OBJECT.*

By SECOND LIEUT. FRANK EASTMAN, U. S. A.,

FOURTEENTH INFANTRY.

TO enable our nation to successfully resist the attacks of an enemy, we must have a large standing army, plenty of time, or be able to place in the field large numbers of organized, armed and trained volunteers or militia.

The first proposition is contrary to the spirit of our Government and is, therefore, impracticable.

In these days of rapid transit, the second requisite—time—would not be allowed us by the enemy.

Then we *must* be able to place in the field large numbers of organized and instructed volunteers or militia, and the most important questions in the military administration, or policy, of our country to-day, is the adoption of some practicable scheme for the instruction of our youth and citizen soldiers in the duties of the modern soldier, and the use to be made of the Regular Army in said scheme.

To make a man an efficient modern soldier, he must be instructed in, 1st. Target practice, including estimating distances. His value as a soldier is almost determined by his skill in the use of his rifle.

2d. Squad drill, the object being the control of the individual in motion.

3d. Manual of arms and care of rifle.

4th. *Setting up* drill and other physical training.

These are classed as *individual*, because, although two or more may be drilled together, or at the same time, the object is *individual instruction*.

Fifteen years ago, target practice was regarded as of little or

* Read before the VANCOUVER BRANCH, M. S. I., Jan. 6, 1890. For Discussion on this paper, see "Comment and Criticism."

no importance, and the man who could hit the target at two hundred yards—off hand—with the U. S. Springfield rifle, two times out of five, was regarded as an excellent shot. Such is not the case to-day, and the instruction of the soldier in the skillful use of his rifle is now very properly considered of primary importance.

The long range, magazine or breech-loading rifle cannot be used effectively without much practice, backed by self-control and good, sound shooting sense.

The soldier should, therefore, receive thorough instruction in the pointing and aiming drill. He should be practised in assuming quickly the different positions for long range firing, and be especially drilled in rapid loading, dummy cartridges being used, in each position. I regard rapid loading a very important part of a soldier's instruction, and it is of special importance when range firing is impracticable; but the ability to load quickly can be acquired only by much practice, and is then of but little value unless accompanied by self-control and the skill to estimate distances accurately.

Gallery practice is beneficial and every man should receive some instruction in such shooting. It could well and profitably take the place of two and three hundred yard practice during the first two years of the first enlistment.

Estimating distance drill is of very much importance, and, in the proper instruction of the citizen soldier, is becoming of more importance every day. Particular attention should be paid to this part of his military education. Every man having an aptitude for such work should exercise his gift on every possible occasion. Officers and non-commissioned officers ought to be experts.

The squad drill by non-commissioned officers is of vastly more importance now than formerly, because in this drill soldiers must be trained to obey the commands, and submit to the control, of the non-commissioned officers. This has become of special importance on the line of battle, as these chiefs of sections and squads must now, more than ever before, maintain discipline and control, and must be especially responsible for the proper expenditure of ammunition. Volley firing by section, or squad, will, in my opinion, prove very effective, and be of great value as a means of regulating this expenditure.

With the old muzzle loading rifle the number of cartridges which could be expended by each man in the longest battle was limited, and the question of supplying ammunition was comparatively

simple ; but to-day this problem is one of great interest and importance, second only to that of how to prevent waste of cartridges in battle.

In the squad drill, the sergeants and corporals should be the instructors. The captains and lieutenants should not do the duties of their subordinates. The efficiency of any company depends to a very great extent—more so now than ever before—upon the efficiency of its non-commissioned officers, but *they can become efficient* only by acquiring the habit of command and the exaction of obedience to their commands.

The manual of arms is important as a means of educating the muscles and nerves of the arms so that the piece may be easily handled, and the more perfect the rifle—or any other machine—the more necessary is its intelligent and careful handling to keep it in a serviceable condition. It is necessary that the soldier be thoroughly instructed in the mechanism of his piece.

Every one will acknowledge that physical training is a very important part of a soldier's education, and a well-equipped gymnasium should be provided at every military post in the country. Such training improves the health, increases the strength and gives self-control—all important qualities in a soldier.

Besides the above instruction, the soldier must be drilled in the platoon, company and battalion to determine his relative movements, and to teach him to act in concert with others. Of course a soldier must, while in service, do many things besides marching and fighting.

The military drill and discipline of our citizen soldier should begin in the primary schools of our land, and be continued through all the different grades up to, and including, our high schools and colleges. They ought to be a compulsory part of the course in all our public and private institutions of learning, because the *perfect soldier* must be physically, intellectually and morally a *perfect man*; therefore his physical, intellectual, moral and military education ought to begin early and continue hand in hand from boyhood till manhood. A soldier has much to learn. Time is, therefore, important, and should be improved to its utmost in his military education.

How shall the instruction be apportioned to the various schools and colleges?

The physical drill should begin in the primary school and be

continued through all grades and in the colleges, universities and normal schools.

Target practice would be impracticable in the primary and grammar schools; but in the high schools, gallery practice to a limited extent, estimating distances and pointing, aiming and rapid loading could be practised, and made both interesting and profitable. By using wooden rifles, which could be furnished by the general or State government at very small expense, the boys in the high schools and grammar schools could be very thoroughly instructed in the manual of arms, guard duty, squad drill, and in many of the simple and important platoon and company movements. Schoolboys take great interest in such drills, and the return to the Government in the shape of military instruction and discipline imparted would greatly exceed the outlay or cost.

Simple tactical movements, such as the formation of column, marching in column of fours, twos and files, and the formation of line from column, could be executed. Such drill would prove of practical utility in case of fire, street parades, etc. All these movements may be executed, of course, without arms.

By a system of commissions and warrants issued to the captains of companies, chiefs of platoons, sections and squads, much emulation would be excited, healthy physical exercises would be provided for and encouraged, a military spirit and a manly bearing would be cultivated, and candidates for appointment to the U. S. Military Academy could be selected—other things being equal—from those showing special aptitude and fitness for the military profession.

In the normal schools, universities and colleges, the course of military drill and discipline should be as extensive and complete as possible *without interfering with the purpose for which the schools were established.*

Platoon and company movements should be practised, and at all State universities, where practicable, suitable target ranges should be provided by the State, and the United States should furnish the necessary arms, ammunition and instructors.

At the normal schools many teachers would receive the necessary instruction to enable them to establish the course of military training and discipline prescribed for their grades of schools.

After consultation with the educational authorities of the several States, carefully prepared *manuals* should be furnished by the

Government for the establishment of a uniform system of instruction in military drill and discipline suited to the needs of the various grades of the schools and colleges to which they may be furnished.

Now an important problem presents itself. To partially educate in the military profession large numbers of boys and young men—our future citizen soldiers—large numbers of skilled instructors will be required, and where shall we get them?

In civil life, the various State normal schools furnish the most skillful teachers, and so these military instructors should come from the Regular Army, the normal school of the military art and science.

Except at a few colleges and universities, the duty required would be that pertaining to the grade of non-commissioned officers, *i. e.*, the individual instruction of the soldier. The instructors required should, therefore, be chosen from the non-commissioned officers of the Regular Army. The duty will be an important one from the nature of the work required, the responsibility and trust imposed, and from the fact that the character and utility of the Army will be judged by the conduct of these instructors. The instructor should, therefore, have an excellent moral character, should be young and intelligent, have a high sense of honor, and be faithful and honest.

Have we now non-commissioned officers fit for the work, responsibility and trust? If not, how can they be obtained?

Evidently, the pay of the non-commissioned officer and the partial military education obtained while in the Service, are not worth the time and labor. In our small Army, with its exceedingly slow promotion, the hopes of winning a commission cannot be offered as an inducement for large numbers of intelligent young men to enlist. *What can be offered?*

In the last report of the Secretary of War, he says—in another connection—"Give the soldier an opportunity to so improve himself that when he leaves the Service he may be better fitted for civil life than when he entered it." Taking those words as a key, I submit my answer to my question.

Offer as a reward for faithful service for a limited time in the Regular Army an opportunity to acquire an excellent education, with the additional inducement of a chance to obtain a commission by the development of marked fitness for the military profession.

How shall this be done?

Enlist, for the term of three years, two or three thousand intelligent young men—the more the better—of excellent character, apportioning them, if possible, to the different Congressional districts. During the first two years—three, if necessary—drill them thoroughly in all the duties of the private soldier and non-commissioned officer, giving them additional instruction in signalling, topographical map-making, and company and post clerical work; then re-enlist for three or four years such of them as may prove themselves fitted for the work, and send them to our high schools, normal schools, universities and colleges, as military instructors. *There they would be able to acquire an education—tuition free. During time out of study and recitation hours,* they can be required to engage in the legitimate duties of their grades, imparting important military instruction to the other pupils of the schools. At the termination of their re-enlistment, they shall be discharged to return to civil life better men than when they left it.

The advantages resulting to the individual from a six years' enlistment in the Regular Army may be thus summed up:

A livelihood. This includes food, clothing, medical attendance during two years of his service, and pay such as to enable him to save something with which to establish himself in the business or profession of his choice.

Thorough physical education and regular habits specially adapted to preparing him for a college course requiring great application of his intellectual powers;

The acquisition of the habits of obedience to, and respect for, superiors, and also the habit of command;

In general, a higher social position than that to which he has been accustomed;

An opportunity for the acquirement of a college, university, normal school or high school education; and,

A military education such as to qualify him to take a prominent, and perhaps a leading, place in the National Guard of his State, and in case our country should become involved in war, place him in a position to distinguish himself in the service of his country.

With such advantages and opportunities presented to him, many a young man of intelligence and ambition would enlist, the Government would assist a meritorious class of young men in acquiring an education, improve the *morale* of the Army, diminish

the number of desertions, and at the same time, obtain the necessary instructors for the citizen soldiery.

I have pointed out how the general government may provide the necessary instructors for its citizen soldiers from its military normal school, the Regular Army; but the State must now provide, or furnish the pupils to be instructed, and if the general government fail so to do, must fix or provide for the suitable organization of its military strength.

The boys of every primary school, grammar school and high school can be organized into squads or platoons of cadets, the non-commissioned officers of which might receive warrants from the State, and these non-commissioned officers, under the direction of the teachers or the instructors furnished by the Government, should be required to drill these squads and platoons in a prescribed course of military exercises suited to the ages of the cadets.

In the colleges, universities and normal schools, all male pupils between certain ages should be enrolled for the purpose of instruction in the State militia, whether residents of the State or not, and be organized into platoons, companies and battalions (if numbers permit), and these platoons, companies and battalions ought to be drilled by the instructors furnished by the Government in a prescribed course similar to that of the cadets but more extensive. (Uniforms are desirable but not necessary.)

State legislatures can enact such laws as may be necessary to put in operation the proposed plan of organization and military training, and to authorize the executives of the States to ask the general government to furnish the necessary instructors.

If the foregoing proposition be impracticable, then let each State, assisted by the Government, offer an inducement to the pupils of the colleges, etc., to voluntarily enroll themselves in the militia. *Let this inducement be made in the shape of assistance in obtaining an education.* This aid can be extended in various ways which will suggest themselves.

If each young man were paid ten cents per hour for a certain number of hours per month during his term of attendance—this time to be devoted to military drill—many a deserving young man would be assisted in acquiring a much prized education, and the State would soon have within its borders a large number of young men partially disciplined and very thoroughly instructed in many of the duties of the modern soldier. *A little investiga-*

tion will show that even sixty cents per week goes a long way toward defraying the expenses of many a young man while obtaining an education.

The Regular Army is supposed to be the basis of military organization in case of war. It is supposed to be a school for officers, one specially fitted to prepare them for the duties and responsibilities of comparatively large commands, and to fit them for the performance of very important staff duties in the field.

Until recently, the great number of posts giving independent commands, the performance of staff duty by the subordinate officers at these same posts, the numerous Indian campaigns, scouts and hunts, all helped to develop good practical soldiers of large experience, and the officers and men were engaged in legitimate military duty. The great masses of the people knew this, and recognized the necessity of having a *regular army*.

But times have changed. The small posts are rapidly disappearing and with them the independent commands and the schools of staff duty. The Indian campaigns are practically a thing of the past. The scouts are no longer attended with danger and made over or through an unknown country, and the hunts are no longer for the deer, antelope, buffalo and bear.

In fact, the practical part of army life as a school of instruction is gone. All that remains are the endless drills with corporal's guards called companies. Captains, as a rule, no longer have independent commands, and the principal duties of the lieutenants—average age thirty-five or forty years—are to drill these same corporal's guards; to go on *officer of the guard* about once in five days (one-fifth of one's time spent in the guard house!); to write up *proceedings* in "*guilty*" cases tried by garrison courts-martial and to recite lessons in tactics which have been in use for twenty years. These duties come day after day, week after week, month after month, and year after year. Commanding officers are puzzled to know how to employ their subordinates. Department and division commanders are likewise concerned, and the people are beginning to wonder what the Regular Army is good for and to believe they can just as well get along without it.

It seems to me it would be well for officers to recognize the actual condition of affairs, and for them to take the lead in introducing radical changes—called innovations by some—in the organization, drill, discipline and uses to be made of the Regular

Army. If they don't, we may wake up some day from our Rip Van Winkle sleep to find our occupation gone.

As a result of all these facts and feelings, various projects are proposed to give us something to do. Summer marches and camps are ordered. The Secretary of War recommends "the establishment at each post of a school in which shall be taught the elementary branches of mathematics, science, mechanics, surveying, engineering, drawing," etc., and adds, "all officers are qualified to supervise or do this work." (?)

In other words, the Secretary proposes, practically :

First. That school-houses or rooms, text-books, school-room furniture, etc., be furnished at considerable yearly expense to teach soldiers what they don't want to learn and what has almost nothing to do with the practical, every-day duties of an enlisted man in time of war ; that these men shall, at the same time that they are studying and reciting in these different branches, also perform almost all garrison and company duties. 'Tis proposed to do all this when the country is full of schools already thoroughly equipped and established for just such purposes.

Second. To use army officers as teachers in these post schools, to use them for purposes for which they were not educated and for which their profession peculiarly unfits them ; to use men experienced, or educated, in the Art and Science of War for purposes requiring a knowledge and experience in the art and science of education ; to use men receiving from one hundred and sixteen to one hundred and seventy-five dollars per month to do the work for which skilled teachers in civil life receive three-quarters as much ; to use men as teachers of elementary branches of education whose every minute should be, and could be, usefully employed in legitimate military duties and studies calculated to fit them for large commands and great responsibilities in time of war.

Such a course would undoubtedly spoil good officers and soldiers to make poor teachers.

In a few years, the captains and a great many first lieutenants will be unfit, physically, for active campaigning, and the remainder of our line officers are being unfitted as surely and as fast as possible for responsibility and command by reason of being kept, during the best years of their lives, engaged in unprofitable and insignificant duties, without responsibility and without command, everything repression and humiliation instead of encouragement and commendation.

The Army is organized for fighting, and the regular officers are the proper instructors in the Art and Science of War. Then use them in legitimate ways:

During the first four years of their service, in acquiring a thorough, practical, individual knowledge of all the details of Army drill, discipline and administration.

During the next four years, give them a post-graduate course of advanced study in the higher branches of the military science, and in the pursuit of specialties for which they may have developed aptitude.

By this time, by reason of age, experience, and education, officers would be fit for duty as military attachés at foreign courts, duty on the staffs of governors of the different States, detail as military professors in colleges, universities, and as inspectors of camps of instruction for the National Guard, each officer according to his fitness for one of the several duties mentioned. During this time, they would acquire a broad knowledge of human nature, be brought into intimate contact and sympathy with the people and its National Guard, and gather up and store up valuable military and personal knowledge of our country, people, productions, etc.

At the end of this last period, they could return to the command of their companies, to which they would probably be promoted by this time—or ought to be—to do such duties as might be required of them, to enjoy these blessings and comforts of home and family life, and qualified for almost any emergency of military life.

ORGANIZATION AND DRILL.

Undoubtedly uniform systems of organization and drill should be established by Congress.

These should be such as to meet, as perfectly as possible, the conditions and requirements of modern war, a war in which battles will be fought with long range magazine rifles, Gatling guns and like instruments of death.

While meeting the above requirements, it is very important that the smaller units of organization, together with their drill, shall be specially adapted to the needs of the country with reference to the rapid organization and drill of the volunteers and militia.

It has been proposed to re-organize our Regular Army on some such plan that it may be increased, in case of war, to a war footing by filling up skeleton companies and battalions with enlisted

men, and sending these companies and battalions into the field under experienced or educated officers. In theory this plan is a good one, and, if it could be carried out in practice, would probably prove the best ; but, unfortunately, volunteers and militia will not serve, at first, under regular army officers.—Our volunteers must go to war under officers of their own choosing—it is a political necessity that they should.

To be adapted to the needs of the National Guard and to a comprehensive plan for a general military instruction of the youth of our country, the unit of instruction ought to be small—a platoon of fifty men, more or less. Three platoons should constitute a company, three companies a battalion and three battalions a regiment.

By unit of instruction, I mean that unit of organization in which the individual instruction of the enlisted man is completed, in which all his individual and relative movements as a fighting machine shall be determined, and that no movement, relative or individual, which shall be required of him in any of the larger units, can be one which has not been required of him in this smallest of units. This unit of fifty men or less would be adapted to the needs of the country, in that in nearly every village, enough young men and boys can be found who are not only willing but anxious to form, organize and drill as a platoon. The boys of each school could be so organized and drilled. Large numbers of these small bodies of partially instructed men in the villages and cities would prove of great value in case of war.

The chief of this unit ought to be a lieutenant and be responsible for all individual drill, my idea being that the captain should have matters of more importance to think about, and attend to, than the position of the little finger in executing *arms port* or *trail arms*.

The drill tactics of this unit ought to provide for a rapid formation of column, a few simple and natural changes in the column formation, the quickest, the most simple way of passing from the column formation into the fighting formation—the line—facing to the front, flank or rear. This drill ought to be suited to all street formations and movements, whether civil or military ; to the drill and movements of our police forces ; to entering and leaving buildings ; to obstructed streets and narrow alleys ; to the needs of the schools as a fire drill, and to street fighting in cases of riot or disturbance.

The next question to be considered is the instruction of the organized National Guard, and certain facts must be remembered in treating this part of my subject, viz.:

The National Guard is now composed principally of young men. Many of them are possessors of wealth, education and refinement, all are very intelligent and the most of them have a natural aptitude and taste for the military profession.

It is composed, to a great extent, of men whose time is very much occupied by business and professional pursuits and social duties.

Its officers are—they must be under the circumstances—men of social standing, great tact and possessed of special aptitude for the military profession.

The instruction of the National Guard during the greater part of the year, must be confined to the limited space of an armory.

The short time available for practical outdoor drills, target practice, marches and encampments; and, that the members of the present National Guard go to considerable personal expense in the way of purchasing uniforms, paying their own transportation to and from encampments, and providing themselves with armories, fitting up the same, etc.

Such being the present state of the National Guard, it follows that if the Government furnish them with instructors, officers or non-commissioned officers, *it must be by request*; that they ought to be selected from the most competent in the Service, and that the instruction must be imparted by means of lectures, suggestions and criticisms on drill, etc., *when asked for*. The adjutant of every regiment of the National Guard, numbering not less than five hundred men, might well be a regular army officer, selected because of his qualifications for the position. If well posted, he could profitably devote his entire time to that regiment and the information imparted by him would be very valuable. Non-commissioned officers might also be detailed, of course, from the very best in the Service.

For instruction in target practice, the State should provide, at suitable places, one or more target ranges completely equipped, and the commanding officers of all military posts should be ordered and required, except during the regular practice season, to place their ranges at the disposal of the National Guard, and to detail competent instructors to assist them.

To these ranges, companies, platoons, sections, squads or individuals should be sent—in uniform or not, at their own option—at times most convenient, there to obtain as much range practice as possible. The practice should be confined to five hundred, six hundred and eight hundred yards—gallery practice in armories can take the place of the two and three hundred yard practice. The former (and longer ranges) will be the battle ranges.

To make men good shots at the shorter ranges, much ammunition must be expended to toughen the shoulders, strengthen the arms, and cultivate the necessary steadiness of nerve. The back position should be practised as being of special value for street fighting.

When ammunition is limited, and time which can be devoted to practice is short, 'tis better that a few men in each platoon be thoroughly instructed than that all should have a little practice each. It is better that one man fire fifty shots than that ten men fire five rounds a piece, skillful shots ought to be detailed from the Regular Army for duty on the State target ranges.

Position drill, rapid loading drill, gallery practice, setting up drill and other physical training, squad drill under non-commissioned officers, platoon and company drill, should receive special attention in armories during the winter months, when out-door practice is impracticable; and, as a preparation for summer encampments, lectures might well be given concerning guard duty and picket duty, the proper care of arms while in camp, and camp hygiene—more men die from disease in camp than are killed in battle. Signalling ought to be practised by a few picked men—preferably telegraph operators—until proficient.

PRACTICE MARCHES.

These must be short, if any be required at all. Time is too limited, and the work too hard to pay for the small amount of practical benefit received.

SUMMER CAMPS OF INSTRUCTION.

Time being necessarily short, no drills or exercises should be required which are practicable in the armory. Skirmish drill, guard duty, estimating distance drill, signalling to a limited extent, long range rifle practice when practicable, and company and battalion movements not practicable in the armory, should constitute the programme, and orders concerning the police of the camp should be rigidly enforced.

The Regular Army officers on duty at colleges and on the governors' staffs could act as inspectors of rifle practice, of summer camps, etc. They also would be in a position to give the National Guard valuable information, *when asked for*, by lectures, suggestions, etc., and at the same time collect and furnish the Government important data of a military character.

The next question to be considered is the cost to the government, State and general, which will result from the adoption of some such plan as I have suggested. This can be determined only in a general and comparative way.

PAY.

The pay of the National Guard can only be such as each State, or the Government, or both, may judge wise.

ARMS.

The Government must have large numbers of rifles and equipments on hand to be prepared for war, and a good share of them can well be in the hands of the National Guard, at colleges, universities, normal schools, with a few available for the instruction of the pupils of the high schools in the pointing and aiming and rapid loading drills.

Thousands of wooden guns could be readily manufactured and furnished the States at cost—or issued free—for use in the schools, etc. They would last for years, and would cost but little.

AMMUNITION.

Nearly one-half of the ammunition used by the Regular Army could be used, as a means of instruction, to better advantage by the National Guard, because nearly all practice at two hundred and three hundred yards during the first and second years of the first enlistment should be dispensed with as unprofitable—gallery practice taking its place. All range practice by men who have qualified as sharp-shooters or marksmen for two or three years, except by those chosen to represent their companies in department competitions, could well be dispensed with as being of little additional value in their military training, these men being—during the remainder of their enlistment—classed as sharp-shooters or marksmen. All officers below the rank of captain, and less than forty years of age, who have qualified any three years, should be classed accordingly without further shooting. All officers over

forty years of age ought not to be required to practice, unless of their own free will, for this practice may be dispensed with as unprofitable.

The ammunition thus saved would go a long way toward supplying the National Guard with what it could use to good advantage; and, by furnishing reloading tools, they would have all the ammunition they could profitably use in target practice.

RANGES.

I may safely say there are many cities and towns in every State, each willing to build in its vicinity, and keep in repair at its own expense, a target range, drill and camp grounds, on condition that they be used yearly by the various military organizations of the States for range practice and *camps of instruction*. It would be a good business investment for them to do so. Several ranges could therefore be provided in large States, and the cost of transportation be reduced to a minimum. The Government ought to sell range material for such ranges at cost price or furnish it free.

TRANSPORTATION.

The transportation of non-commissioned officers to colleges etc., would cost but little, if any, more than the post schools with their furniture, books, etc., as proposed. The rifle ranges being properly located, the cost of transporting the National Guard to and from them would be reduced to a minimum as the railway companies generally give reduced rates to such organizations.

The advantages accruing to the Government from the proposed plan may be enumerated as follows:

First. A rapidly increasing body of thoroughly drilled, disciplined, educated and practised non-commissioned officers and soldiers employed in the pursuits of civil life, but bound to the Government by ties of gratitude.

Second. Large numbers of young men, partially educated, at schools, colleges, etc., in the duties of the modern soldier.

Third. A large proportion of the Regular Army would soon be young, ambitious Americans, having so much at stake that desertions and trials by courts-martial would be reduced almost to a minimum, and the Army would be much more efficient and popular.

Fourth. A much more efficient body of educated officers, well

acquainted and in sympathy with the people and its National Guard.

Fifth. The officers and non-commissioned officers of the Regular Army would be given occupation in the legitimate military duty of educating themselves and the soldiers of our future wars in the Art and Science of War. The Regular Army would thus become the American War College of our citizen soldiers, and the instructors therein, the officers, would have every opportunity to become the most efficient leaders and commanders possible, without actual experience in war.

Reprints and Translations.

DISCIPLINE :

ITS IMPORTANCE TO AN ARMED FORCE, AND THE BEST MEANS OF PROMOTING AND MAINTAINING IT.*

PRÉCIS BY LIEUTENANT E. M. LEWIS, U. S. A.,

ELEVENTH INFANTRY.

HAMLEY, in his "Operations of War," says : " Discipline is made up of a number of different qualities," and it is only by a proper appreciation of these qualities and a due knowledge of their action and reaction upon each other that a successful discipline can be obtained, and when maintained, can be kept up ; for this, like every other moral or physical quality, can only be maintained in a flourishing condition by constant exercise, and it is one that is very prone to deteriorate unless carefully and judiciously watched and guarded.

Discipline has to do with the mental as well as the physical functions. On the one hand, it aims at overcoming fear, love of pleasure, indolence and recklessness, with the view of bringing the whole nature under control ; while on the other it aims at guiding and directing the more noble emotions of enthusiasm, patriotism, and devotion to a leader ; so that these, too, may be brought into harmony with the general whole ; and, above all, it aims at inspiring a strong sense of duty, to become, as it were, a second and inalienable nature. The great aim and object of all discipline is not only to maintain order and to insure obedience and submission to authority, but also to produce and establish that cohesion between the individuals composing an army, which is essential if complete success is to be obtained in the operations in which it may happen to be engaged. In peace-time it underlies and forms the basis of the entire military fabric ; and in war it is the invisible essence which, permeating an entire army, inspires it with the soul of the commander, and enables it to achieve great and glorious deeds. Such a sense of duty as is required is no plant of a spontaneous growth, but must be carefully cultivated and tended, and to this end the means of promoting and maintaining discipline must be directed. The practical method of producing and maintaining this quality in the most perfect degree is the problem to be solved.

* The pages that follow are largely a compilation from four English writers upon the same subject (Capt. F. Daniell, Capt. C. E. Telfer, Capt. F. G. Stone, and Capt. R. M. Murray, R. U. S. I. Journal, No. 148). Where passages have been used, the present author has had in view the selection of those which apply to the general case or to the special case of our Regular Army.

Habit is, as all the world knows, a very strong motive power, and one which has in itself an innate faculty of increase of strength and energy. Habits, bad or good, once formed by the repetition of certain acts, or even mental processes, gradually become a part of the life of the individual, and, finally, are almost unconsciously obeyed. Of what vast importance it is, then, that in the case of a soldier, care should be taken that the habits implanted in his nature in the ordinary every-day routine of his military life should be such as will increase his value when called upon to act in any, however humble a capacity, as one of a corporate body from which unanimity and uniformity are imperatively required. A soldier cannot and dare not, in many cases, stop to consider the why and wherefore of his action; the action must be instantaneous, and yet it must be adapted to its end; consequently he must be so trained that right thought and right action are practically one and the same thing.

It has to be borne in mind further that the requirements of the present day are something more than those of a past time, not so very many years distant. All that was ever demanded from a soldier is demanded still, and the development of military science makes yet further demands, but the progress of the age has also produced a class of soldier from whom more may justly be required. The private soldier of to-day is a very different sort of man from the private soldier of even thirty years ago; his mental qualifications are of a far higher order, he is better educated, has more respect for himself, and is altogether of a more independent character, by which is meant that he is more capable of acting alone, and far more capable of understanding the reasons why, under certain circumstances, he is required to act in certain ways. Thus the problem is complicated, for where "organic unity" is required, we cannot but recognize an increased individuality which has to be guided and controlled without being stifled.

And if this organic unity is needed for the ordinary routine of peace, it becomes ten-fold more necessary in the theatre of war, when such mighty issues depend upon the perfection of each smallest link in the chain. In peace-time, a laxity of discipline will cause inconvenience, annoyance, and a good deal of extra trouble to every one concerned; in war-time it will cause disaster and ruin. In the actual stress of battle, the all-absorbing struggle for life will keep men braced up to their task; but when the blood is warmed with no keen excitement, when the frame is wearied with long marches, and the mind with uncertainty as to what may happen; then it is that good discipline makes itself evident more than at any other time, and then must a leader feel that on the existence of it all depends.

Necessary as it is to preserve discipline during the fight, it is more necessary still in all those multifarious operations of war which culminate in the battle. When the bullets are actually whistling around them, there are many feelings which carry men on to their goal. In the excitement and tension of the nerves attendant on such moments, with some the innate savagery of human nature wakes up and overbalances other feelings, with others the positive knowledge that the forward path is the safer, all tend to make men go on; but when the din of battle is not raging, when each man has full consciousness of fatigue, hunger, and uncertainty, then there is no

other feeling to keep him up but that stern sense of duty as duty, in other words, a sense of discipline.

Yet again there is another time when this is all-important, namely, in the moment of victory, and this for two reasons, firstly, a tactical one lest, when the cohesion of the attacking force has been lost, as inevitably it will be lost in the assault, and the reserves, perhaps, swallowed up to give weight to the decisive stroke, the enemy should be able, by a dexterous counterstroke from fresh troops, to turn the tide of battle and roll back the victors in confusion: secondly, a moral one, lest when the position is carried and the enemy is in retreat, the savage spirit which may have been roused in the attack should lead individuals to commit acts which in cooler moments they would shrink from, and which may stain the lustre of the country's arms. Those who have had experience of battle-fields will not be insensible to the importance of a very strict sense of discipline at this critical moment.

Marshal McMahon's retreat with his army after the battle of Woerth is given by General Hamley as a typical example of the conduct of undisciplined troops under such circumstances. Within a few days of the commencement of a campaign, two entire army corps were, for the time being, practically out of the question, so far as offering any resistance to an advancing invader was concerned. This example shows clearly enough the necessity of discipline during retreat, but the case may be further strengthened by an example which tells in the other way, namely, the wonderful manner in which the Grand Army in its retreat from Moscow, though beset by every conceivable disadvantage, effected the passage of the Beresina in the presence of the enemy.

In spite of the hardships and privations which this army had undergone, and the dispiriting sense of the failure of their enterprise under which they must have been laboring, there was that spirit alive in them which enabled them to perform this great feat of skill and endurance, which certainly could never have been carried to a successful issue had not their sense of discipline been strong enough to survive the shocks to which it had been exposed, and to make them remember that though misfortune had come heavily upon them they were soldiers still, and the conditions of duty were in nowise altered.

Having thus shown the truth of what was so nearly an axiom as to render further proof almost unnecessary—that discipline is important to an armed force, we come to a point to be dealt with which is one of the utmost importance, namely, Fire Discipline.

It is important to consider this, not only because on the field of battle it is of such overwhelming moment, but also it is one which unlike most of the other points which go to make up discipline, cannot well be perfected in peace-time, though no doubt a sound foundation can and ought to be laid, on which it will be safe to build in actual war; but since the result cannot be thoroughly and fairly judged, save by experience, we can never feel quite sure till we have tried, whether we have actually attained the object we wish for, so it is well to keep the problem constantly before our minds. Forewarned is forearmed, and if we are pre-

pared for a difficulty which is almost certain to arise, we shall be the better prepared to meet it when it actually comes.

While with infantry the question of controlling the fire on the battlefield is a most difficult one, as far as the artillery is concerned, it is much simpler. Even with breech-loading guns, the time taken between each round is necessarily long enough to enable the officers in charge of platoons to keep the fire well in hand, and also the longer ranges at which artillery will, as a rule, fight, makes the task of fire discipline comparatively easy. Even when, in the later stage of the action, artillery is pushed further on, still the nature of the arm is a salutary check, and also at that time extreme accuracy of fire is not so imperatively necessary; a case shot cannot well miss everything and everybody.

If the infantry firing could be confined to volleys, the problem would be in a great measure solved; but in open order fighting where parts of each organization become distended and even separated, this is impossible. In the battle of Woerth, for instance, the battalions launched to the attack, became gradually dissolved as they crossed the Sauer, and pushed across the low ground to the foot of the opposite hills, and there was indeed little opportunity for volley firing; battalions and companies were mixed up, little knots or groups pushed forward as they could, and no pause was practicable for a volley, even if an officer could have made his voice heard above the din to give the necessary orders.

The increased range of the rifle has made fire practicable at long ranges, and the more highly trained the men are in shooting, the more use can be made of this increased power of the arm, so at these stages volleys can be employed, and with well-disciplined troops will be most useful, but it is not at this stage that the real difficulty of fire discipline has begun. Even here it is very doubtful whether anything on a larger scale than a platoon volley can be attempted, but later on when the opposing troops have pushed closer to one another, and the action begins to wax warm, then it is that the real difficulty begins, for the control of the fire will pass into the hands of the sectional commanders, and these are the men above all others, the subalterns, sergeants and corporals, upon whom the question of fire discipline must be urged, and whom we must hammer away at till it has become a second nature to them to think of it.

In a book lately written, it is said with reference to a remark of General Skoboleff's that he could not urge too strongly on commanders to have the fire of their men under control, that this is to be done by so "regularly, consistently, and persistently putting the soldier through the action of firing by orders that it shall be a second nature to him to fire his rifle only under control of his superior, and not otherwise;" now, if this can be achieved the problem is solved, but the principle must not be pushed too far, so that the man will always wait for an order before firing, for this will not work in practice. It is all-important that the superior should thoroughly recognize his duty of controlling fire, but it will never do to lead the men to think that there will always be this superior to look to, in short, much must be left to the man himself, and it is in fitting him for this necessary contingency that the control exercised by the superior should be

directed. The above quoted author says in another place, "the voice counts for nothing during the greater part of the struggle," and if this be true, as it undoubtedly is, it is no good teaching men always to look for orders, for in the din of battle they will not hear them when given, even if there be a superior on the spot to give them.

This question, more than any other, is now engaging the attention of soldiers, and it is pretty generally admitted on all sides that the army which has the best fire discipline will be the victorious army of the future. The experience of the Germans in 1870 amply showed the necessity of fire discipline, and with their accustomed steady perseverance and energetic use of the opportunity afforded by peace, they have diligently set this problem before themselves, and will, no doubt, effect a practical solution of this, as they have of so many other difficulties of military training.

Just how much the problem will be simplified by the introduction of the smokeless and almost noiseless powder adopted by France and Germany remains to be seen. The diminution in the noise made by the discharge of fire-arms will certainly enable captains to make themselves heard further, but the absence of smoke in firing will to a certain degree prevent his detecting those men in his command who are wasting their ammunition.

It has been said that the simplification of drill will shorten the necessary period of enlistment, but this is far from being the case ; the training of the soldier will take just as long as before, for the end to be gained is one harder of attainment, and the means adopted must be even more energetic.

It is impossible to lay down any hard and fast rules, but it seems that what is wanted is to begin at the very root, and employ the time allotted to training in impressing upon every single man, but above all upon officers, and non-commissioned officers, the value of fire, the way in which this value is multiplied tenfold by a cool and thinking use of it, and the importance of not just letting off a rifle, but of shooting so as to hit and kill.

Every captain must pay more and more attention to each individual man of his company ; at drill, on the target range, and in the lecture-room, he must impress upon every man, and urge upon his subalterns and non-commissioned officers this question of fire discipline.

We still seem to have some lingering notion that a soldier, like a poet, is born and not made, but, as a matter of fact, probably for every one born soldier a thousand are made, and made by a persistent and lengthy process ; the knowledge of war does not come by nature, it must be learned like everything else, and we want to realize that point. "Will, study, and perseverance," said Napoleon, "have made me what I am."

Practically, then, let each captain try to realize the problem himself, and to impress it upon his men. "Constant dropping wears away the stone," and we shall not get what we want by a miracle, or by any sudden inspiration on the part of ourselves or our men ; it will only be by a constant endeavor to implant the fact that a good soldier must have a cool head, a steady hand and a deliberate aim at some special object. The real gravity

of the situation should be laid before the men ; it is a serious thing to go with your life in your hand to meet probable death with a cheerful face and stout heart, but they will not find it any the easier because they have not realized the situation till they are actually face to face with it ; so it is just as well to put it plainly before them that there is difficulty, and there is danger, but that the spirit of duty, that is discipline, has to be raised and strengthened that the difficulty may be faced, the danger braved, and the object gained.

Now to apply what has been said to the case of the actual attack with a view to obtaining the necessary fire discipline. It must be presumed that no regiment will take the field without having undergone some such system of personal and individual instruction as has been indicated above, and there is one leading feature which must not be lost sight of, namely, that the commander of a battalion cannot be everywhere and do everything ; he has his own proper sphere of action, and he cannot take the place of his majors, captains and subalterns. It is no good his attempting to do so, and such an attempt will only lead to confusion ; he must be content to let each individual officer carry out his individual part of the battle.

Of late years, with improved and improving fire-arms, the different stages of a battle are not at all what they were, the effect of fire begins at a much greater range than formerly, and this is so far in our favor. In this early stage fire discipline may be rigid, for the men are still kept together, the noise is not too deafening, and the excitement of battle has not yet reached fever heat, so volleys are admissible, possible, and effective. Even here though these volleys will at most be only company or half company volleys, so at this stage the fight is beginning to be worked out by the company officers. Then as the advance progresses, as bullets fall thick and fast, and many a gap appears in the ranks, excitement increases, the men want to fire rapidly, no matter whether they can see anything definite to fire at or not, and at once the officers have a harder task, but still a good deal of control can be exercised if the officers and men are accustomed to one another, and the tendency to fire wild must and can be checked. This will be all the easier if each man has had thoroughly impressed upon him that every shot which does not disable an enemy is not only wasted but actually adds to the risk of the man firing, by depriving him of ammunition which he will stand in urgent need of later on.

Then comes the other stage when the action is at its hottest, when the opposing troops are well in view, and then is the hardest task of all, a task, too, which will fall in a great measure on sectional leaders, and whenever an officer or non-commissioned officer can then gather a group near him which can see him and look to him for guidance, he will exercise a very important influence on the fight ; he may not be able to get a volley fired, but if he and the men have been well trained he will be able to exercise a salutary check upon their firing, and prevent waste of ammunition with its attendant risks. He will be able to insure fire being delivered when and where it will be effective ; in fact, if each sectional leader will keep his head and use it, he can do much in the way of control, and probably this is all he can be expected to do.

To sum up, fire discipline means decentralization of authority. Each

rank has quite enough to do if it does what is required of it, and the commander cannot do the captain's work nor the captain the subaltern's, and so on to the last link of the chain. Decentralize authority, educate individuals in peace with the greatest care that they may know their duty, and in action let them do it.

The next point to be considered is discipline mainly from an administrative point of view. Although, of course, the object of all discipline is tactical efficiency, yet the various parts of the machinery employed in training troops in peace, which are not immediately and directly connected with their tactical handling in the field, can be included under this general heading of discipline for administrative purposes. Here, as first in importance, as well as underlying very nearly every aspect of the subject, will be first considered the giving of orders.

Now if we want to get discipline, the relation between giving an order and the carrying out of that order should be so close that practically they are one and the same thing. A superior must not be disobeyed; immediate and cheerful compliance is essential, and an officer's duty does not end with giving an order; as one who is responsible for the proper training of his men he must go a step further, and see that the order is complied with. This rests entirely with the officer himself and the manner in which he gives his order has a very great deal to do with it.

In our Army, it is hardly necessary to urge upon the officers the duty of courtesy toward the men, for it is to be found to a very marked degree, but it is important to see that it is not forgotten by non-commissioned officers. "Manly rank is a credit to any soldier, but a domineering parade of rank is only a display of ignorance and imbecility." Officers are fortunate if they get sergeants and corporals who will actually carry out in their dealings with the men principles such as these; the discipline of a company or of a battalion becomes tenfold easier, and a feeling of comfort pervades all ranks. But to attain this they must treat non-commissioned officers in the same way, for the behavior of the latter to the men is a reflex of the behavior of the officers to themselves, only with any mistakes exaggerated, and for the object we want, namely, a prompt obedience of orders, mutual respect is necessary.

The Army, of course, contains within its ranks, a number of very different natures, and there are many officers who seem to be able to get what they want done by the men with very little difficulty, while others never seem quite to succeed in establishing what the Duke of Wellington spoke of as "the mutual confidence between officers and men." With every wish to maintain a strict but not a harsh discipline, they somehow cannot quite manage it, and the force of circumstances drives them into difficult situations, whence they cannot well escape without seeming harshness or undue laxity. We are inclined to think that the quality of being able to deal with men is a natural gift, and we envy the possessors, but while it is in part natural, it is not altogether so.

In dealing with men, it is the firm and steady hand which helps discipline; and if an officer has not got this quality by nature, he will have in the ordinary course of his profession every opportunity of acquiring it, if he

wishes to do so. Natural indolence, natural irritability or impatience can be overcome, and unless an officer does succeed in overcoming these things he will never get his orders obeyed in an emergency.

Command is just as much a duty as obedience, and it has been well said that the faculty for so giving an order as to leave the impression that it is as much the duty of him who gives the order to give it as of him who receives it to obey it, is a most valuable one to cultivate. Firstly, then, in giving an order he who gives it must be convinced that it is his duty to do so; unnecessary worrying orders are fatal to discipline, men get fretted by little trivialities being made into matters of importance, and of course, however trivial the order of a superior may seem to be, it must be obeyed.

An order should be indisputably necessary, but when an order has been issued by superior authority, however unreasonable or faulty it may appear, it is the duty of all officers to loyally carry it out; there must be no questioning or grumbling. Let every officer in such a case remember that he is doing something more than carrying out an order of which he disapproves, he is setting an example of discipline. Hesitation in obeying orders, or an ill-grace in carrying them out on the part of an officer, will sow the seeds of indiscipline among the men, seeds which, under the influence of hardship and danger, will bring forth their fruit all too soon, and spread with frightful rapidity through an army.

Next in importance, the order should be very definite. According to Van Hardegg, "an order is short when it does not contain one word too much, complete when there is not a syllable wanting:" prolixity is above everything to be avoided, it creates a confused impression on the mind of the recipient, and where we want right action to follow right reasoning the idea conveyed to the mind of one who receives an order must be a clear impression of the idea in the mind of the superior who gives it.

There is another point of importance, and that is that every one who gives an order should thoroughly realize in his own mind what will be the result ensuing from it. Sometimes orders are given which in themselves are perfectly legitimate and right, but which cause an inconceivable amount of friction and discontent because they are either given at the wrong time, or they are of a nature to thoroughly upset a number of collateral things, of which probably the officer who gave the order had not the slightest idea.

Fussiness should be carefully avoided, for however well meant, it is death to discipline. Soldiers are not children, and they get irritated by fussiness, even if the object be their own comfort and advantage, but definiteness of purpose will go a long way with them.

Punishment is a necessary though disagreeable means for the enforcing of discipline, though "discipline enforced by punishment alone is a poor sort of discipline which would not stand any severe strain."

What must be aimed at is that high state of discipline which springs from a military system administered with impartiality and judgment, so as to induce in all ranks a feeling of duty, and the assurance that while no offense will be passed over, no offender will be unjustly dealt with. This expresses the three main points to be observed and the object to be gained,

namely, impartiality, judgment, and an unbroken sequence between cause and effect tending to produce in all ranks a feeling of duty.

Now, there is nothing which tends more to preserve discipline than the knowledge among the men that they will not escape the consequences of their acts; that there will be no weak "letting off" on the part of their officers, but that so surely as they break the rules laid down for them, they will be called to a reckoning, and have to take their punishment. Of course, there are some cases where men will deliberately go and commit some military crime with the full knowledge that they will have to take the consequences; and with no attempt at concealment, they simply do as they choose, and then brazen it out. But these are not the ordinary cases, and when once a man understands that there is no element of chance about the matter, but that punishment follows crime as a matter of course, he will be a good deal more careful how he conducts himself. Very few people, officers or others, take any pleasure in dealing out punishment, and young officers especially are inclined to obey the natural promptings of, perhaps, an easy-going disposition, and to let men off. But this is really the greatest possible mistake; it is not a high sense of duty, and is no real kindness, and the sooner every officer realizes that the question is not one of individual inclination, but just simply a matter of duty, the better it will be for them and their men, and the more a right and sound discipline will flourish.

This does not apply to first offenses. In all cases, let mild reproof and admonition be first tried, but when these are found useless, and punishment has to be resorted to, let there be no weak holding back, but let every officer, of whatever age and length of service, do his duty.

For young officers this is often very hard, and by a good many mistakes they gradually learn how to carry out their duties in this matter: the offender is often, in more senses than one, a much older soldier than his superior, and he tries to see how far he can go. Some mistakes will inevitably be made, but it is just as well to bear in mind that while these mistakes are being made, which perhaps no one ever hears of, or knows save by their results, the cause of discipline is decidedly suffering.

Then there must be some logical proportion between the breaking of the law, and the consequent penalties, and these penalties must be in all main features, the same under similar circumstances. The Articles of War permit courts-martial to award for most offenses, punishments that are limited only by the death penalty. To this freedom are to be attributed many cases of apparent injustice, as that, for instance, recently quoted, in which two soldiers deserted on the same day from the same post, and surrendered themselves or were apprehended on the same day. They were tried by different courts-martial, and one received eighteen months' confinement and the other five years. There seems to be in our Army a growing desire for a penal code which will designate the proper amount of punishment (within certain narrow limits) for various military crimes. A revision of the Articles of War was recently recommended in several of the annual reports.

Aside from the apparent injustice of many varying sentences of courts-martial for the same offense, the fact that such variation may exist is detri-

mental to discipline. When men begin to see that similar offenses meet on different occasions with unequal punishments, at once they know that the element of chance has been brought in, it may be their fortune to come in for a light sentence, or their ill-luck to come in for a heavy one, and as has been said before, this element of chance is one which is very hurtful to discipline. It is far better that a man should know positively that he will undergo a punishment of severity proportionate to his offense than that he should feel uncertain whether he will, on the one hand, be very severely dealt with, or on the other, get off very lightly; and this feeling of certainty will promote discipline as much as the opposite feeling injures it.

Corporal punishment in the Army is forbidden by law, and yet General Upton says:

"During the American Rebellion there was scarcely a regiment in which corporal punishment in some form was not *daily* administered, and this arose from no desire to violate the law, but from a necessity to which many representatives in Congress can testify. Even the expedient of the Field Officer's court-martial failed in its object, for when troops were on marches there was no time to take evidence and make out proceedings. When, therefore, stragglers and marauders returned to their regiments, the colonels adopted the sure and expeditious process of pronouncing a punishment, which, being brief in its character, allowed the offender to be restored speedily to duty," a strong argument, apparently, in favor of flogging; but did the punishment effect its object, viz., the re-establishment of discipline and the *prevention* of further crime? Evidently not, for the punishment was *daily* inflicted! Would not the punishment of death, inflicted in the first case of desertion, marauding, or insubordination, have served as an example which would have obviated the necessity for flogging, by deterring would-be evil-doers in the future from incurring a like penalty?

It has been said that the worst use to which a man can be put is to hang him; this may be extended with regard to a soldier to the question of imprisonment, considering him as an individual supported by the State for the performance of certain definite duties, and trained for those duties at a considerable amount of trouble and expense. It is probably about the worst use we can put him to, to imprison him. As long as he is in prison he is an unproductive factor in the Army, he is doing no good, and is still costing money to the country, and when he comes out, there is every prospect of his being a worse soldier than when he went in. Unfortunately, imprisonment is in many cases a necessity, but if the principle is recognized, as it is decidedly being recognized now, that it is a makeshift sort of expedient at the best, it will be well in the interests of discipline, as well as in those of economy, to minimize imprisonment as much as possible.

In the class from which soldiers are drawn, the stigma of going to prison is a very deep and real one, and it is a class which is not prone to appreciate subtle points of reasoning as to the cause for which the imprisonment is awarded, or the nature of the crime which has brought about this punishment. Going to prison simply means to them just what the words convey; they feel the disgrace of it very keenly, and when a soldier for the first time comes out of the guard-house he feels himself lowered in the eyes of

society, so that it is difficult for him to make a fresh start, and right himself in the opinion of his world.

From every point of view, long terms of imprisonment without discharge are not likely to do much good; if they are intended to impress upon the offender the sense of his wrong-doing, a shorter term will effect this equally well, and certainly it is not for the good of the State that a soldier should be kept eating the bread of idleness—so far as military duty is concerned—for a longer period than can be avoided, even if the bread be only prison fare. In cases where the gravity of the crime makes a long sentence necessary, it is better in the interests of discipline that it should be coupled with discharge, for the soldier, unless a very exceptional sort of man, is not likely to be of much good afterwards.

Dishonorable discharge is a very powerful weapon in the hands of courts-martial, and now that evidence of previous convictions is admitted, it can be more generally used. It is very evident that recent legislation and changes in the Regulations have in view the improving of the condition of the soldier. We want to have better men under the colors than we have had previously, and we hope to get them. In the wide field, however, from which we draw our recruits, we get hold of some very doubtful characters, and they are nothing but a nuisance when we have got them, they keep up the crime average, both by their own acts and by the example they set to otherwise well-disposed men, and they are not worth keeping. Yet somehow or other, we are very long suffering before we finally get rid of them, and in the meantime they are a plague spot. Is this because we are so put to it for men that we can't afford to lose these black sheep? Surely not! Recruiting is active, and in a flourishing condition, and we can get soldiers if we want them, whereas the existence of these bad characters in the ranks tends to give soldiering a bad name, and to stop decent recruits from enlisting.

The prejudice against the Army that used to exist in the classes from which our soldiers are drawn is slowly dying away, but it has not gone yet. Officers are constantly finding that men in the ranks are going under their "soldier names," because they are ashamed to have their friends know that they are wearing a uniform of which they ought to feel proud.

Now, if the thoroughly low and bad stamp of man be ruthlessly weeded out of the Army, the lads who go back to their homes on furlough will be all the more inclined to attract others by their story of military life, and we shall gain both in the number and the quality of recruits; while if the public in general find that the village blackguard is not good enough, nor nearly good enough for a soldier, but that we will not keep him, their ideas about the Army, already, as has been said, improving, will improve still more. If we can reform the ne'er-do-weel—and we very often do, and make him a respectable member of society—all well and good, and the country gains a man, but why keep him to be a thorn in everybody's side, a useless mouth to feed, and an evil influence among his comrades?

The objection is often raised that by discharging a man the authorities simply do for him exactly what he would wish, that having found the Service is not such a good place for a worthless character as he fancied it would

be, all he wants is to get out of it. This is true, but if we go to the real root of the matter it is doubtful whether this objection will prove quite a sound and reasonable one. The object we aim at is to get good and trustworthy soldiers, not to use the mechanism of the military machine in making life unpleasant to a bad character who steadily declines to be reformed; if the man is kept in the Service he learns certainly that rules cannot be broken with impunity, and in many cases he passes a large proportion of his time under punishment, but the question is, does the country and the Army gain anything by this? Public money is spent, but is there any adequate return for it; is the general good advanced by the unavailing attempt to make a soldier out of such very unpromising material; would it not be better, even at the risk of falling in with the wishes of the offender, to let him see plainly that the Army does not want him, and will not have him, and to send him about his business summarily? Any satisfaction that he may derive from this can be considerably minimized if he has brought himself into the position of a prisoner before a court-martial, by a sharp and severe sentence of discharge followed by imprisonment.

If this measure were a little more fully used, every one in a regiment would be saved a great deal of trouble, and the cause of discipline would certainly profit. The ranks of our Army can be filled with decent men who will make good soldiers; what, therefore, is the use of keeping those who simply go on from one crime to another and are always being punished, even if their offenses are of only minor degree? Let them go, and the Service is well rid of them.

The question of obtaining good and reliable non-commissioned officers is one that has a material bearing upon the discipline of the Army. What company commander is there who has not, at some time or another, found himself in the awkward dilemma of either disregarding a non-commissioned officer's story or punishing a man, perhaps unjustly? To let a non-commissioned officer feel, and to let the men see, that he is not trusted, is fatal to discipline, while to let any man have grounds for thinking that he is unfairly dealt with is equally fatal. If any officer be in the position of having non-commissioned officers under him who are not perfectly trustworthy, he is likely often to find himself in a very uncomfortable predicament, which it will need all his tact and experience to come safely out of without prejudice to discipline. There is no royal road out of this difficulty; neither officers nor non-commissioned officers can by any magic process be rendered immaculate specimens of perfect tact and temper and of unerring judgment, but a difficulty fairly looked at and understood, is in a fair way of being overcome by energy and determination.

The question is again simply one of training, a slow and gradual process, but, like many other gradual processes, an effective one. To make a very young soldier a non-commissioned officer, however smart he may be, and however capable of repeating pages of the drill-book, is simply to court complications of this kind. Before any man is allowed to wear a stripe, he should be a proved man, and one who has thoroughly learnt the duty of disciplining himself before he attempts to exercise any function of command over others. There are plenty of men who have nearly every good

quality which a soldier should have—men whom every one in the regiment would like to see in the non-commissioned ranks—but they have not got just that tact and temper which are needed, and, hard as it may seem, they should never be promoted, at any rate till they have remedied this defect, and this both in the interests of discipline and of themselves.

Again, some non-commissioned officers do very well on the drill-ground or under the supervision of a superior, but make dismal failures when sent in command of a body on detached service. In our Army, the non-commissioned officers are practically chosen by the captains, whose duty it is to see that they are properly trained. He should select only such men as he feels that he can trust, and he should let them see that he does trust them fully, and that any betrayal of such trust will meet with severe and prompt measures.

Food is another important factor in the discipline of troops.

Discipline aims at the perfection of the human machine; health is one of the primary necessities for this perfection, and food is inseparably connected with health.

It is a matter of common and everyday experience that a man's temper is very much dependent upon the state of his stomach, and it has passed almost into a proverb that things assume a brighter aspect after a good dinner.

Human nature is the same in soldiers as in other people, and a man who is turned out of bed on a cold morning and marched off to "early stables" on an empty stomach is not in a state of mind or body which is conducive to his keeping himself well within the bounds of discipline if anything occurs to ruffle him, and this is especially the case with recruits, who not only usually have larger appetites, and so feel the effect of an empty stomach more keenly, but also, in their early days in the Service have morning squad drills which hardly the greatest enthusiast could call especially interesting, the continuance of the second exercise and balance step being somewhat trying even to the best temper.

Exact science, with calculations of heat value and work value, says that the soldier's food is sufficient, but then exact science cannot by its nature duly take into account the ever varying personal factors of the equation. What is sufficient for the old soldier, with all his muscles set and his bodily frame fully developed, is by no means necessarily enough for the hungry young recruit, who is daily adding to his supply of bone and muscle, and who also is doing work of a kind to which he has been utterly unaccustomed, and which demands bodily exertions of a kind very different from those required by his former avocation, whatever it may have been, but all necessary in the process of "setting him up" as a soldier.

The cause for general drunkenness in a company has more than once been traced to a lack in quantity, quality or proper preparation of the food supply. A natural but ungratified appetite for wholesome food develops into an unnatural appetite for stimulants.

Some captains especially pride themselves upon the fare of their men, and it would conduce to the comfort of soldiers throughout the Army if more company commanders would make the kitchen a matter of study and

more careful personal supervision. That the ration should be increased by the addition of at least potatoes and onions is now generally acknowledged by all, but those in whose power it lies to make the change.

If the cause of discipline can be at all advanced by a little common sense attention to the matter of food, it is well worth while devoting this attention to it, for a young soldier before he has thoroughly learnt the lesson of discipline will have plenty of temptation to break through its rules without having the additional one of an empty or only half-filled stomach to add to them.

Canteens, gymnasiums, club-rooms and the like act beneficially for discipline. All that tends to make men contented, tends to keep them within bounds, and such sources of comfort and pleasure as the above form additional inducements for good men to enter the Service.

The best means of promoting and maintaining discipline can hardly be considered to have been fully dealt with without some mention having been made of the subject of combined manœuvres, considering them in the light of their value from a disciplinary rather than from a tactical point of view, the latter being beyond the scope of this essay.

It is a fact that no thinking man will deny that our Army sees too little of this kind of work. In barrack or permanent post the routine goes on steadily, and every one gets to know his duty and place so well that no very great effort is needed to keep things going, but when men cut loose from familiar duties and surroundings, all is different; it causes a general shake-up, so to speak, of all ranks, and throws every one more upon his own resources, which is a very desirable thing, for commanding officers can then better gauge the value of the officers, non-commissioned officers and men under them. It does away with a mechanical way of going on, and is beneficial to everybody; weak points and strong ones will appear which have hitherto perhaps escaped observation, and it is better that we should discover our weak points before we actually take the field in war, when it may be too late to remedy them.

Competition and emulation between different organizations and different arms would prove beneficial both to officers and men, and *esprit de corps* would be fostered and increased.

The attainment of discipline is a long and sometimes an uphill task; like most other things it is only done by slow degrees, and success is only to be achieved by persevering efforts which never lose sight of the goal, but steadily inch by inch fight their way towards it.

The question is one of combined moral and physical qualities, and must be considered in all its complex relations by those who would discipline the men under them. No incident of military life is too small to exercise its influence upon the result, no incident is so important that it alone can do the work; the whole process is that of some great and complicated machine the effect of which is clearly evident, but to the production of which effect the perfect adjustment of the minutest cog, of the most delicate and almost imperceptible spring, is necessary.

The end before us is a noble one, the means are surely therefore worthy of our earnest attention. Soldiering is now no holiday pastime, it is not

and can never be an occupation to fill up odd moments, and to be taken up as a sort of semblance of employment, it must be the real hard and earnest work of a life.

Just in proportion as every one feels this, so will a perfect discipline be easier of attainment.

The conclusion then is that we should first try to realize the conditions of the problem, and train *ourselves* to a high state of discipline, and then set to work in every action of our life as soldiers to apply these conditions. Whether it be in the giving of a simple order, the confining of a prisoner, the inspection of a barrack-room, or in any other circumstances whatever, we should look to the end, and endeavor with all our might to be thorough and whole-hearted in striving for this end.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN,

Translated by MAJOR W. L. HASKIN, U. S. A.

X.

HOW THE ARTILLERY SAVED ITSELF IN THE LAST WAR.

THERE remains to be examined one point in regard to which the artillery appears under a much better light in 1870-71 than in 1866.

In 1866 a number of pieces withdrew from the firing line either to refit or to evade the fire of the enemy's infantry, while in 1870 this has not occurred.

Whenever it happened in 1866 the fault was due to the regulations which had been elaborated during the long period of peace, or to customs which had acquired the force of law. Neither the one nor the other was based upon experience acquired in actual warfare.

Recall to mind that part of the regulations devoted to the exercises called "mechanical manœuvres and repairs," the greater part of which had no other aim than to "save" the pieces.

The chief one of these manœuvres, that one in which the men were all first exercised, was the placing of a trailing-beam under the axle of the piece to take the place of a disabled wheel. How much importance was attached to having the different lashings made with the greatest care! But in what could this be employed if not in carrying the piece from the field, that is, in retreating with it. It is true that the men were told that the piece thus sustained could be fired, and to prove this a blank cartridge was fired from a piece so supported. But when a piece was once fired with projectile during the course of one of the firings "for instruction and study," the recoil broke the support as though it had been a toothpick, to the great amazement of the corps of officers who certainly had their instruction in this respect well and fully completed on that occasion.

Where is this beam or pole to be obtained just when it is wanted? The regulations reply to this question by requiring that a tree in the vicinity should be cut down and trimmed to the required form. But it is perfectly plain that this carpenter-work will take more time than would be required to obtain a spare wheel from the repair wagon. Yet the employment of the trailing-beam remained none the less the favorite mechanical manœuvre.

There was also the manœuvre which consisted in suspending the piece under the limber; another manœuvre which had no other aim than to "save" the piece—to carry it to the rear when an opportunity offered. But, in the four campaigns of 1864, 1866, 1870 and 1871, I never saw the trailing-beam used nor a piece suspended from a limber. I will go even farther and assert that no officer has put in practice either the one or the other of these manœuvres during either of these campaigns.

The regulations certainly required that all these mechanical manœuvres and repairs should be executed in the line of fire "if it be possible," but it also required that the pieces which could not be repaired in the firing line should be taken to the rear to be repaired outside of the dangerous zone of the enemy's fire. This dangerous space has been considerably extended by the invention of the rifled piece, and a disabled piece may now have to go 4,000 yards to the rear. If a captain were to send a single piece this distance to the rear under the charge of a non-commissioned officer he could hardly expect to see it return. It is very difficult to know whether it is going to be possible to proceed with the repairs while still under fire since that depends upon the severity of this fire during the time required to make the repairs, and it cannot be known in advance whether it is going to be violent or not.

Whenever, therefore, a single piece, or several pieces in a battery, needed repairs, the battery commander could withdraw the entire battery from the line "in order to refit" without contravening the regulations in any way.

It was considered a very great dishonor to lose a piece. Ever since the War of Liberation it had been the custom to exercise great severity in this respect. When Bernadotte hesitated to comply with the reiterated requests made to him by Blücher to come to take part in the battle of Leipzig—because the movement seemed to him to be too hazardous, he said emphatically that he had taken part in such and so many battles without ever losing a piece.

It is right and proper that the cannoneer should prefer to die under his piece rather than to lose it, for upon the piece is engraved the eagle, and with the hand upon the piece he takes his oath of allegiance. For him the piece is the flag. Yet it is better to lose a piece than a battle.

Wholly different principles were established in regard to this matter after the War of 1866. In 1870 and 1871 we lost pieces in action just as we lost flags, but how great the glory these lost pieces conferred upon the troops who were forced to abandon them to the enemy! The circumstances attending these losses constitute some of the most glorious deeds of our military history. The principle had finally been established that the loss of a piece did not necessarily constitute a disgrace, simply because of

the loss ; but that the important thing to be considered was the manner in which the troops had conducted themselves at the time.

After the War of 1866 the principle was established that no piece, no matter what its condition, should be withdrawn from the firing line. This is why all the pieces in the war which followed remained in position and were repaired there with the aid of spare parts taken from the repair wagon which was posted within reach with the first echelon of caissons.

Experience had shown the necessity of formulating this principle, for the temptation to obey the semblance of a necessity was perhaps too great for many a battery commander, leading him to quit the field under cover of the requirements of the regulations. A praiseworthy desire to preserve all his pieces might even have led to this determination.

I have heretofore had occasion to remark that the instinct of self-preservation inherent in human nature never manifests itself directly with persons of high and noble nature, but that to exert its influence upon the actions of such persons, it makes use of some plausible pretext and by its assistance slowly works its will. From the moment this pretext ceases to exist the instinct is silenced, for all such individuals desire above all things to do their duty. The necessity for repairs to the pieces, the failure of ammunition, exposure to the fire of the enemy's infantry (this last point I shall speak of later), all these were such pretexts and were all in some sort justifiable. But it is very difficult to determine at what moment the instinct which hides itself behind the pretext speaks to the heart of the man. That depends absolutely upon his nerves and the amount of resistance they are capable of offering.

The manner and actions of many of the men who first came under fire impressed me very much as do those of a party which bathes in a cold river on a very warm day. It is with the greatest pleasure that they throw themselves into the water. At first the coolness causes a delicious feeling, but after a time some of them begin to shiver and desire to go out ; others are seized with this desire a little later, and it does not come to others for quite a long time. It is necessary to have strong nerves and the habit of bathing to feel at ease in the water for long periods. In every case the company is more gay when dressing themselves than when they were in the water.

The nerves of our officers were absolutely the same in 1870 as in 1866, but the requirements of the regulations had been changed. The first principle was that no line of artillery, that no piece, should retire without having received the order to do so. It is for this reason that I never, in the whole course of the War of 1870, saw any artillery withdraw from the line for repairs. There were a certain number of pieces dismounted. At St. Privat, as I have already said, there were three pieces in all the batteries placed under my orders which were unable to advance when we moved forward to sustain the infantry attack. Of course, they remained in their places. They were repaired there, and as soon as possible they rejoined us in our new position. At Sedan one of my pieces was totally disabled—the piece had burst. But it nevertheless remained on the firing line. I believe that with the other corps in 1870 it was extremely rare for an artillery line or a piece to retire without having received orders to do so.

Prior to 1866, there existed in the regulations evolutions which had no other object than to teach the men to run away from the enemy. This is a hard thing to say, but I find no better way of describing them. Furthermore, these were the very evolutions which were practised from choice and in which the men were exercised again and again, for when they were well executed they made a very beautiful display.

How can that manœuvre be anything other than a flight which consisted in making a horse battery retire at a trot at the instant when the lunettes of the carriages were caught upon the pintle-hooks of the limbers and before the cannoneers could possibly get into their saddles, the captain afterward leading them after the pieces at a gallop. Did you ever see a horse battery at drill (before 1866) that did not execute this manœuvre? It was certainly an exciting spectacle to see the horsemen mounting with marvelous skill and agility and following their pieces at the top of their speed. But suppose the slightest fault to be committed in the execution of this evolution when in the presence of the enemy. Suppose simply that the captain fails to see that his sixth piece has not had time to limber up, and that he orders the trot too soon. What happens? Five pieces and a limber start off at a trot; the cannoneers mount and follow; the projectiles sent after them by the enemy cause the draught horses to accelerate their speed; their trot becomes a gallop, then a run. It is in vain the captain tries to overtake the limber which has deserted its piece. The horses which draw it go as fast as his own. The noise of the wheels drowns his voice and his trumpet signals. The gait of the captain, who goes at his greatest speed to overtake the limber, seems to his men but a proof that he is content to see them retire at such great speed, and so the whole mass retrogrades at a triple gallop and traverses perhaps a German mile before some obstacle brings it to a stop. To crown his misfortune it might happen that the cavalry with which he had originally advanced might bring his lost piece to the rear by the aid of lariats before his orders to return for it could be executed. It would only remain for him to blush with shame while he thanked them for their kindness in returning to him his prodigal child.

I do not know whether such a thing happened in 1866; I believe not; but this I do know, that after that campaign the rule was placed in the regulations that if the artillery receives orders to retire it shall do so only at a walk, and that a more rapid gait can be allowed only in exceptional cases, such as when the battery finds itself within the field of fire of an artillery line which has opened from a position farther to the rear,—a line upon which it also must proceed to post itself. In all cases, *artillery retiring must never traverse the first hundred paces after limbering up at any other gait than a walk.*

The new regulations contain this same provision, and in this way the practice of teaching the horse batteries how to run away from the enemy was made at one blow to disappear from the field of manœuvres. In the interval between 1866 and 1870, it was never seen.

There was another still more showy method of performing rapid retrograde movements prescribed by the regulations, which consisted in causing the mounted detachments of the horse artillery to make an attack upon the

enemy in open order, while their pieces were retiring to occupy a new position in rear.

I acknowledge that when I was a lieutenant I always greatly enjoyed making one of these attacks. When it had been made the trumpets sounded the recall or rally, and the horsemen came tearing back at full speed over the space they had traversed in charging and back to the new position, a distance sometimes of 1,500 paces. The field of manœuvre was covered with these horsemen riding furiously. They had to require of their horses all the speed of which they were capable in order to reach the battery and unmask its front before the first piece, loaded by the drivers of the swing teams, was fired; and all the civil and military spectators gave free expression to their admiration of the magnificent spectacle they had witnessed. My heart beat rapidly and I was excited by the rapid movements and flattered by the approbation of comrades, until I almost believed that I had taken part in an heroic action, for this movement was in some sort the crowning display of the preparatory artillery exercises. I did not consider that such an attack upon the enemy was wholly impracticable, and that even if it were practicable it would be an error to make it, and that there was nothing to be proud of in having run away, for this crowning event of our evolutions represented nothing else but a flight.

Perhaps you do not agree with me in my view of this evolution, but think it really practicable, and do not acknowledge that it would be wrong to make it. Think a little! At what distance from us must we suppose the enemy to be when it is proper to make this attack? A hundred paces? Then he will rout the cannoneers and will follow the pieces pell-mell with them and will overtake them, for they cannot have gone far. Let us say 400 paces or more. In that case I make my retrograde movement with all my cannoneers,—I make no attack,—the enemy does not overtake me. I shall not have sacrificed half my men and thus weakened the efficiency of my battery. You certainly cannot suppose that the charge will be a successful one. If the enemy were so few in number that the 48 cannoneers of the battery, acting as cavalry, can rout them, one salvo of canister well directed and fired at 200 paces will reduce their number to such an extent that the survivors, even if they reach the battery, will no longer be strong enough to capture it.

There are those who think that the cannoneers of a horse battery should join a cavalry charging line as a reinforcement to it. To my mind it would be just as proper for a battalion commander attacking a village to cause the platoon of cavalry attached to his force to dismount and fight on foot as a reinforcement to his skirmish line. It is true that this has been done, but only at Kriegspiel and by a lieutenant fresh from the corps of cadets.

Under any circumstances that you can imagine, the battery will do ten times as much execution by its fire as by an attack executed by its cannoneers, and they will check the enemy much more certainly by its fire than by one of these attacks, provided the men remain steady and aim with coolness. It is, therefore, much better to continue firing than to make one of these attacks, and to make one will be a blunder.

The rule that artillery in retiring should never traverse the first hundred

paces faster than at a walk caused this manœuvre also to disappear in the interval between 1866 and 1870.

Horse artillery being now armed with rifled pieces and infantry with long range arms, it is my belief that none of these attacks by the cannoneers of a battery can take place in future.

These evolutions appear to have had their origin in a single event which occurred in the War of Liberation.

It so happened that a horse battery which had opened fire was attacked on its flank by a small body of the enemy's skirmishers. Although the range of the smooth-bore musket was very limited these men succeeded in reaching the battery with their bullets, and according to the ideas then prevalent, this was a case in which the battery should have withdrawn. But this captain was made of different stuff. He mounted a part of his cannoneers and routed the enemy's skirmishers with them. This action brought great credit upon him and it was but just that it should. Later he became chief of staff of the artillery (General von Jenichen) and finally he was named one of the inspectors of artillery. In fact he was one of the most highly esteemed generals of his time. His ideas had the force of law, and his brilliant deeds served as examples to the artillery. The cavalry attack executed by horse artillery was therefore introduced under the most varied different forms. As a matter of course they were never omitted when the celebrated Jenichen was the inspector.

An occurrence of this kind could not again take place, for skirmishers annoy us now at a thousand paces, and certainly you would not send cannoneers to that distance. The fire of the battery is much more effective than the few sabres of the cannoneers, and at the present time ten sharpshooters would suffice to repulse fifty cannoneers who were to execute an attack of this kind.

In order that the batteries should be in condition to render the maximum of service, it would be advisable, from an artillery point of view, that the cannoneer should have no other arm than his piece, that he should concentrate all his activity upon the service of the piece, and should see in it his sole means of safety.

I could name to you an artillery officer of high rank (if he had authorized me to use his name) who rode among the batteries with the greatest coolness, playing meanwhile with a riding whip which he carried because his horse sometimes refused to jump obstacles. He was riding thus when cavalry charged the batteries. His aide-de-camp asked him if he was not going to draw his sword, and he replied: "I certainly shall not. Instead of aiming and firing the cannoneers would quickly follow my example, and then the cavalry would surely reach us." The charge was stopped fifty paces from the pieces, the cavalry being riddled through and through with canister.

Unfortunately there are reasons which prevent us from taking into the field soldiers who do not carry side-arms. They have need of them for this or for that purpose—during the march or in bivouac—perhaps to defend themselves against hostile inhabitants. Besides a soldier without arms cuts a melancholy figure.

General von Dresky wrote me in his letter, of which I have already spoken, that in traversing the narrow streets of Vionville on his way to the battle-field he placed the cannoneers of two of the pieces of horse artillery at the head of the column to clear the way of wagons, etc., which might obstruct the road. If these men had had no sabres it is certain that they could not have accomplished this task. But for this purpose it was not necessary that they should have been taught to make an attack; it sufficed that they could ride and use a sabre.

Generally one commits an error when, on account of an exceptional occurrence in campaign, one practices the men in the particular manœuvre then made use of. It is a useless expenditure of a part of the precious time assigned to the exercises and manœuvres.

It happened to me one day that a battalion of horse artillery under my orders was sent to occupy cantonments in the immediate vicinity of a place garrisoned by the enemy with no protecting force between the cantonments and the enemy. I do not know whose fault it was, and it is not here a matter of importance, that the troops of the other arms designated for the purpose had not yet reached their destination, but I do know that the battalion commander established grand guards, posted videttes, and threw out patrols in the direction of the enemy until, after several hours, the troops of the other arms arrived. But this occurrence has never put it into my head to demand, on account of this single and exceptional case, that the cannoneers of the horse artillery should be exercised in peace time in the service of advanced posts as practised by the cavalry.

In his recollections General von Dresky relates the following: "After the taking of Orleans on the 5th of December, 1870, the 3d Corps received orders to operate upon the right bank of the Loire, ascending the river in the direction of Bourges. The corps marched upon a single road in the following order: 5th Division; Corps Artillery; 6th Division;—and to avoid delays marched in extended order. I followed the 5th Division at a distance of about 2,000 yards. When we approached Gien on the 8th December we heard in front of us quite a lively fusillade, but it very soon ceased. I therefore continued my march, and very soon the artillery reached Gien, which the 5th Division had just passed through. It had had an affair with the enemy's light troops lodged in the houses of the suburb on the left bank of the Loire. The bridge was blown up and the river was full of ice. The streets of the city run parallel and perpendicular to the river, and when the head of my column entered one of the latter, isolated shots fired from the houses of the suburb reached us, probably fired by some of the light troops who had returned after the 5th Division had passed. As I had no infantry with me I could not, at the moment, undertake anything in the narrow streets of the city. Besides, I suffered no loss, for the enemy fired too high. At the exit from Gien the Briare road follows the bank of the Loire, which at this place has a breadth of about 500 paces. On one side of the river the road is lined with large poplars, and on the other side are houses. When I had passed the gate with a part of the leading battery the fire upon us from the suburb became so violent that I had some wounded. Fortunately the wounds were slight, and the horses

chiefly were hit. The trees protected us to some extent, and the enemy fired very badly. I ordered the leading battery to go into position and cannonade the enemy. The battery fired twice, a house was burned, and the enemy disappeared, so that I was able to continue my march without further annoyance."

It will hardly occur to any one to demand, in view of the exceptional occurrence just related, that the regulations should contain directions for practising artillery in traversing a city occupied by the enemy's infantry.

Perhaps you are not yet convinced and will still assert, in spite of all I have said, that the case could present itself in which the artillery should withdraw from its position precipitately.

You will acknowledge, perhaps, that if cavalry does succeed in approaching so nearly as to necessitate the greatest haste in retreating, it will then be altogether too late to withdraw, and consequently it will be by all means preferable that the artillery should continue to fire.

But, what say you, if it be infantry which suddenly throws itself upon you? You demand then that we follow the old maxims and reëstablish the principle that artillery should take to its heels when a few infantry bullets fall in the batteries.

It must stand firm; it can and it should stand firm even if the infantry comes within a thousand paces,—even within 500 paces. That is just the time when it will lend the most efficient aid to the infantry fighting at its side. It is then that it will decimate and drive back the enemy who thinks himself about to triumph.

But you will perhaps demand of me what the artillery will do if the enemy's infantry succeed in surprising it and show themselves suddenly within a hundred paces. Then the pieces could not possibly withdraw by limbering up and starting off at a trot, for the enemy's infantry would do at least enough execution to disable one horse in each team and then the pieces can go no farther and will necessarily be captured. Artillery in this case can save itself in but one way, and that is by repulsing the enemy by the fire of its guns. It may perhaps succeed in doing so even if the last shot be fired when the assailant is no more than ten paces from the pieces.

The 5th Battery of 4-pdrs. of the Guard at Königrätz, when about to retire from Rosberitz with a small force which was driven back by a superior force of the enemy, saw suddenly appear from a wide ravine hardly a hundred feet distant (so says the report of the battery) a mass of the enemy's infantry equal in number to a division of two companies. The captain ordered canister fire but the pieces were already loaded with shell and these were first fired and in bursting among the closed ranks of the enemy produced even more effect than canister. Thanks to this fire, combined with a rapid fire from a company which faced about, the enemy was driven back. The battery profited by this repulse to retire steadily and in good order.

Generally, artillery should never retire while an attack against it is in progress. This is the most favorable moment for the effect that it is called upon to produce. If it be ordered to withdraw it should profit by the moment when the enemy has been stopped by its fire and has drawn back to renew his attack when he shall have been reinforced. But if the artillery

receives the order from the general in command to withdraw from the line (without an order it will never retreat) too late for it to do so steadily and in good order, then it should not attempt to retire at all, and if the pieces are lost it is not the artillery which will have been responsible for it. It is far better to fall gloriously in continuing the fight than to be captured while in flight.

These are the principles taught the artillery after the War of 1866, and which it observed in the campaign of 1870. It was in obeying them that it stood fast at Spicheren on the Roth Berg; that at Vionville the line of artillery held its position in the very midst of the fighting;—that we lost pieces gloriously at St. Privat, near Amanvillers and at Beaune-la-Rolande; and that at Coulmiers, where we lost the battle we lost no pieces. At Amanvillers we had more pieces temporarily disabled than we lost to the enemy, for many of the batteries, as was shown by their reports of losses, lost all the men and horses in the firing line, but later received other men and teams and continued to figure as active batteries. At Coulmiers we lost no pieces because the batteries took advantage of a moment when the enemy's attack was checked to obey the order they had received to withdraw from the action.

There were in the artillery regulations many other rules indicating the great importance attached to saving the pieces, and the very nature of these rules was such as to undermine the firmness of the arm when opposed to the enemy,—not that it feared the enemy, but because it feared to be blamed.

Let me cite some of these rules to you.

I have an old "Manual for Officers of the Prussian Artillery," and on page 696 of this manual, paragraph 5, b, relating to the choice of a position, I find: "It is necessary that the ground selected upon which to post batteries on the field of battle should be such that they can move in any direction, but *particularly to the rear.*" If this rule had still been in force in 1870, General von Bülow would not have had the right at Spicheren to conduct the two batteries by the road through woods,—a steep and narrow road skirting a rough and rocky slope,—for the purpose of assuring the position upon the Roth Berg. In the same way Colonel von Dresky at Vionville, would have disobeyed the regulations in establishing his corps artillery in a position just beyond a marsh and narrow bridge which, besides, was under the enemy's infantry fire.

These two examples will suffice, I think. If I were to continue and cite all those I know I would fill a large book with them, for I am convinced that three-fourths of all the positions selected by our artillery in 1870 and 1871 belonged to the category of positions excluded by the regulations given above.

But after the War of 1866 these rules were modified. There was no more mention of retrograde movements. On the contrary, it was declared to be the sacred duty of the artillery to occupy with the greatest possible rapidity all positions taken by the infantry in order to insure a firm hold upon them. When it does this it has, nine times in ten, a defile in its rear and consequently no longer has liberty of movement "especially to the rear."

In the case when there is no possible way of saving the artillery our manual indicates here and there an expedient. On page 812 you will find for example this regulation concerning the surrender of a fortress. "The officer commanding the artillery of the place shall determine all, both as to quantity and quality, that is in the artillery depot, and shall endeavor to obtain a receipt." *Sapienti sat.*

This manual was not a private publication, as was the case with the Compendium of Oelze but bore on its title page the words "By Authority," which gave it at least a quasi-official character.

We cannot resist a feeling of astonishment that such rules should ever have found place in the regulations of an arm which had performed so many glorious deeds in the War of Liberation. As for myself I find no other explanation than the following fact. The longer the period of peace, the more we find ourselves guided by the experience gained upon the field of manœuvres, and the more we neglect and forget the experience gained in war.

In the grand manœuvres up to the time of the War of 1864, as you doubtless remember, the greatest disgrace for the artillery was to be taken prisoner and to have its pieces captured. For the other arms it was a glorious thing to capture the enemy's pieces, and therefore they devoted their greatest energies to the attempt.

A good soldier risks his life willingly, but not his honor. It was wholly natural then that the artillery should not willingly expose itself to the danger of capture.

It is probably the result of this feeling, together with the spirit of faithful accountability and of over-scrupulous administration, which guided the officers who drew up the regulations, and which caused them to introduce these rules, which certainly were not the results of experience gained in war. For these officers had not made a campaign in the fifty years of continuous peace. That the veterans of the War of Liberation may have authorized the promulgation of these rules is explained by their great extent and prolixity. The manual of which I have spoken contains 871 octavo pages of small type. Where is the general of artillery who, in the midst of his engrossing professional duties, will find the time to read attentively and control minutely all that such an extended treatise contains?

In speaking to you of the rules contained in this book, I am not divulging the things of which the artillery made a mystery. The book was for sale, any one could buy it.

As to what relates to the avoidance by the artillery of the dangerous zone of infantry fire that also was introduced in the long period of peace. It was seriously held that artillery should avoid it. "Do you not see that you are exposed to direct infantry fire?" was one of the most severe reproaches that could be addressed to a battery commander at the grand manœuvres. An artillery line exposed to infantry fire was required to retire whether it wished to or not. If a captain declared that he did not wish to retire,—that he believed the moment to have come when he should hold his position in spite of everything,—he would be told not to talk such nonsense. The umpire always ordered this withdrawal, and he must be obeyed, otherwise the grand manœuvres would not have been possible.

While infantry fire attained a much greater range by the introduction of the breech-loading rifle, the artillery, not yet having rifled pieces (say from 1850 to 1860) played a very unenviable part at the grand manœuvres, and this necessarily caused it to be greatly discouraged. It could seldom advance against an enemy to exercise decisive action, for the infantry arm carried farther than its piece, and it was not allowed to remain under its fire. Therefore every time that it occupied a position it was very quickly driven from it by infantry fire, the umpire always so deciding. Thus it was driven from position to position, and, while going from one to the other, had to take very good care besides that it was not captured by a squadron of the enemy's cavalry.

The other arms at this epoch preferred to engage the enemy's artillery rather than to have to do with their own. Their own was of no great assistance to them and they were obliged to defend it, for when they allowed it to be captured they were severely reproached. On the other hand they could capture the enemy's artillery, and in this manner distinguish themselves. Understanding all this, it is possible to comprehend the feeling of a certain not over bright officer who said: "I prefer not to employ the artillery at all. I am constantly found fault with on account of it."

I could cite hundreds, even thousands of cases in the War of 1870-71 which prove that artillery need not retire before infantry fire if it wishes to hold its ground.

This decision of the umpires at the grand manœuvres constraining the artillery to retreat before the fire of infantry can then be considered as wholly irrational.

It is unfortunate in its results; for, if repeated without ceasing during a long period of peace, all the officers commanding artillery who have not seen actual field service will end in believing that artillery really is incapable of successfully opposing infantry fire, and the natural consequence will be that in action they will withdraw from before it as many others have heretofore done.

The officers who have seen no field service will very soon form the majority in our Army. At this date fourteen years have passed since the battle of St. Privat, and upon our frontiers everything has so pacific an aspect that we are tempted to believe that war will not menace us during the remainder of the present century.

It is then essential that this warning should be plainly understood in time—that the utmost care should be taken during the long period of peace not to engraft upon the grand manœuvres the habits, the errors, by which false ideas are inculcated, and that we should not announce decisions upon which officers, bound to obedience, might guide themselves at the outset of a campaign, and by so doing expose themselves, innocently enough, to the very grave suspicion of having willingly avoided the fire of the enemy's infantry.

I say again, and cannot repeat too often, that *artillery can never be driven from its position by infantry if it does not choose to go.*

It is at the moment when the infantry fire is heaviest that it is least able to retire, because many horses will have been killed. But because it can-

not withdraw it should not consider itself lost. While some few cannoneers remain standing at the pieces who steadily continue to load and fire, it will preserve all its vigor, its full and entire action. This vigor and this action will not come to an end till the last cannoneer shall have been placed *hors-de-combat*.

Certainly the umpire at the grand manœuvres cannot always decide that the artillery is victorious, but he cannot oblige it to take to flight if it will not fly. He will have to render some other decision,—no matter what. He could, for instance, declare it to be annihilated. But if it has acted in conformity with its tactical principles,—if at the special point of view of the artillery it has done all that it should do,—the umpire, in his criticisms of the manœuvres, should praise and not blame it for having been annihilated, and should certainly not make it a cause for reproof. This is the only method possible to apply in the grand manœuvres if it be desired that in actual service the artillery shall always show that spirit of self-sacrifice which should animate it.

I cannot assert that all the umpires have adopted this method since the War of 1866. On the contrary, the decision that the artillery shall retire because exposed to infantry fire has been as frequently announced between 1866 and 1870, and even after the War of 1870, as before.

The artillery, however, has itself been animated with the desire to prove that it is as capable of standing fast under the fusillade as infantry is. It was then the arm itself which, animated by the true Prussian military spirit, took the initiative in its resolution to hold its ground.

This proves also that it was not the fault of the men who commanded the artillery in 1866 if their arm, without experience in actual war, basing its actions simply upon habitual practice and upon the rules given in the regulations, did not render service so signal, so brilliant, as it did in 1870.

In 1870 the artillery was greatly desirous of proving that it was the equal of infantry, a thing which the events of 1866 seemed to render doubtful. For this reason it acted in direct contradiction to the arbitrary decisions which had been announced up to that time. From this sentiment came the heroism displayed by the batteries posted on the Roth Berg, near Saarbrück, and the tenacity with which all the batteries at Vionville held the first position taken by Colonel von Dresky. It is this also which throws light upon the meaning of the captain of the 6th Light Battery of the Guard (Ising) when he was asked, after St. Privat when they were amputating his arm, whether he suffered much. "Suffer! That is nothing. I would willingly have lost my other arm also to prove that we could stand our ground against infantry fire." It is this same sentiment that explains the order given by an officer in command of an artillery line in 1870, when one of his subordinates remarked that the line was exposed to infantry fire and would probably have to retire. His answer was: "That is true. Sound the call 'Drivers' Dismount!' Now we cannot retire."

I will not annoy you farther with illustrations borrowed from military history, for they will finally tire you out. Perhaps that has already been done. Permit me only to add this conclusion, based upon statistics. If the military medical staff were required to make a report upon the number

of wounded in 1870-71 in the German artillery, a report showing how many of these were wounded by the enemy's artillery and how many by his infantry, the result I am convinced would be as follows: 65 per cent were caused by infantry fire. That is the proportion in the batteries under my orders and I have no reason to believe that the rest of the artillery has been any less obstinate in holding to its positions. The most tenacious were certainly the batteries of the Roth Berg at Spicheren and the line of artillery at Vionville.

If the artillery wishes to be safe, it must destroy the enemy. That is its only means of safety. If this fails,—at least it will have saved its honor.

MUSKETRY FIRE IN THE HILLS.

BY MAJOR A. J. WATSON,

GARRISON INSTRUCTOR. RANIKHET.

(Reprinted from the Journal of the United Service Institution of India.)

THE question of up and down-hill firing is one upon which little appears to have been written, and as far as musketry fire is concerned nothing is at present laid down on this subject in the text-books. The Treatise on Military Small Arms dismisses the subject in these words: "Military rifles are always sighted for horizontal distances, and it is sometimes asked if the graduations on the back-sights would be correct in firing at objects at the same distances, but at a much higher or lower level. The answer is not a simple one, as it can be shown that in a vacuum the sighting for certain angles, both above and below the horizontal, agrees with the horizontal sighting, while for other angles there is a difference; the question is further complicated by the resistance of the air; at moderate ranges the ordinary sighting may be taken as sufficiently accurate." Words which would imply that the subject was one not worthy of having much attention bestowed upon it.

It is strange that this should be the feeling on the subject in these days when so much attention is given to everything else that bears upon musketry, when books are published every day which discuss the allowances to be made for wind, weather, height above the sea, fouling, and even the effect of a passing cloud, and when any practised rifle shot can tell the elevation required under almost any circumstances to the hundredth of an inch.

But if one comes to ask what effect will be produced if the range be sloping instead of level we at once find ourselves involved in uncertainty, and will receive answers somewhat as follows:

"I don't suppose it can make much difference," or, "I have never tried myself, but it stands to reason you must want less elevation firing down-hill and more firing up," this latter assertion is sometimes accounted for by the greater resistance of the air, sometimes by the force of gravity, this force being occasionally credited with extraordinary powers, for example, in the

course of correspondence on the subject of this paper, I have seen it asserted that if a bullet were fired vertically from a Martini-Henry rifle it would not (so great is the force of gravity) go 1,000 yards up in the air. If this were the case it would render a balloon reconnaissance a feat of small risk.

However, to leave opinion we will now come to the conditions of the problem itself, and I hope to be able to give a solution of it which, though not claiming rigorous mathematical accuracy, gives, I think, a sufficiently near result for practical purposes. The general conclusion which I have arrived at is this, that, while it is true that more elevation is required when firing up-hill than when firing at the same distance down-hill, yet that in both cases, less elevation is required than would be the case if firing at the same distance on the level.

I will then refer to the results of some experiments which through the kindness and courtesy of Mr. Coldstream, the Deputy Commissioner, and the municipal and police authorities, and with the able assistance of Captain Hayden and several members of the 2d P. R. V., I have recently carried out at Simla. A comparison of the elevation found to be necessary in each case with that arrived at by the theory, will, I hope, show the practical soundness of the latter.

At the risk of being tedious I will now go through the steps of the calculation by which the results are arrived at, and will endeavor to do so in as few words as possible.

The object of giving elevation to a rifle, as every one knows, is to counteract the fall of the bullet below the line of fire, which is due to the force of gravity, this force, when the range is horizontal, acts at right angles to the range, and any change in the amount of this force will make a corresponding change in the elevation required. Thus, the reduction of elevation necessary, when firing at a considerable height above the sea is to a slight degree due to the reduced force of gravity as well as the greater rarification of the atmosphere.

We must observe that it is the effect of the force drawing the bullet down to the range that has to be allowed for, and acting at right angles to the range, that has to be counteracted by the elevation of the rifle.

Now, when we come to a sloping range, if, according to the well-known principle of the resolution of forces, we resolve the force of gravity into two parts, one parallel to the direction of the range, and the other perpendicular to it, both of these resolved parts will be less than the force of gravity, since in a right angled triangle the side opposite to the right angle is greater than either of the other two sides. Therefore, when firing on an inclined range the force drawing the bullet from the line of fire (*i. e.*, the resolved part perpendicular to the range) is less than that when firing on the level, which is the whole force of gravity. At the same time, the other resolved part of the force of gravity, that parallel to the range, will act against the general direction of the bullet when firing up-hill and somewhat increase its time of flight, and consequently the time during which the force drawing the bullet from the line of fire acts, and when firing down-hill the reverse will be case.

The calculation will be as follows :

Let the slope of the range be A° .

The resolved part of the force of gravity perpendicular to the range will be $g \cos A^\circ$ and that parallel to the range $g \sin A^\circ$.

Let R be the range in feet.

v " mean velocity of the bullet.*

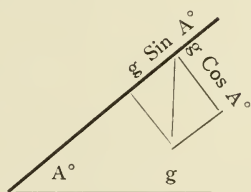
t " time of flight in seconds.

g " force of gravity.

H " drop of the bullet.

we have $H = \frac{1}{2} g t^2$; but $t = \frac{R}{v}$

$$\therefore H = \frac{1}{2} g \frac{R^2}{v^2}$$



Now let t_1 , t_2 be the times of flight when firing down and up-hill respectively on a range equal to R , but sloping at an angle of A° .

The change of velocities at the end of these times due to the resolved part $g \sin A^\circ$ will be $g \sin A^\circ t_1$ and $g \sin A^\circ t_2$ respectively, and the change of mean velocities during the whole of these times will be $\frac{1}{2} g \sin A^\circ t_1$, and $\frac{1}{2} g \sin A^\circ t_2$ respectively and therefore the mean velocities of the bullet in the two cases will be

$v + \frac{1}{2} g \sin A^\circ t_1$, down-hill, and

$v - \frac{1}{2} g \sin A^\circ t_2$, up-hill,

but the time of flight is equal to the range divided by the mean velocity, therefore we have

$$t_1 = \frac{R}{v + \frac{1}{2} g \sin A^\circ t_1} \text{ and}$$

$$t_2 = \frac{R}{v - \frac{1}{2} g \sin A^\circ t_2}$$

Now since $\frac{1}{2} g \sin A^\circ$ is very small compared with R and v † and as t_1 , t_2 , differ but slightly from t , they may without sensible error be replaced in the fractions by t , we therefore get

$$t_1 = \frac{R}{v + \frac{1}{2} g t \sin A^\circ} \text{ and}$$

$$t_2 = \frac{R}{v - \frac{1}{2} g t \sin A^\circ}$$

* This was approximated in the calculation by taking the initial and final velocities as given in the Musketry Regulations, page 237, and taking the mean, thus for 400 yards,

Initial v	=	1315
v at 100 yards	=	1167
" 200 "	=	1053
" 300 "	=	982
" 400 "	=	922
	5	5439
Mean v	=	1087

† It varies between 0 and 16·1 feet.

Taking the case of firing down-hill and substituting for $t, \frac{R}{v}$, and inverting we have

$$\frac{1}{t_1} = \frac{v + \frac{1}{2} g \frac{R}{v} \sin A^\circ}{R}$$

$$= \frac{v}{R} + \frac{1}{2} g \frac{\sin A^\circ}{v}$$

Squaring both sides

$$\frac{1}{t_1^2} = \frac{v^2}{R^2} + \frac{g \sin A^\circ}{R} + \frac{g^2 \sin^2 A^\circ}{4 v^2}$$

The value of the last term is so small that it may be neglected, we therefore get

$$\frac{1}{t_1^2} = \frac{v^2 \times R g \sin A^\circ}{R^2}$$

$$\therefore t_1^2 = \frac{R^2}{v^2 + R g \sin A^\circ}$$

Now we have seen that the force drawing the bullet down perpendicularly to the range is $g \cos A$, and it acts for a time t_1 ; therefore if H_1 be the distance the bullet is drawn from the line of fire towards the range we have

$$H_1 = \frac{1}{2} g \cos A t_1^2$$

$$= \frac{1}{2} g \cos A^\circ \frac{R^2}{v^2 + R g \sin A^\circ}$$

$$\text{but } H = \frac{1}{2} g \frac{R^2}{v^2}$$

$$\therefore \frac{H_1}{H} = \cos A^\circ \frac{v^2}{v^2 + R g \sin A^\circ}$$

But if E_1 be the elevation required to counteract H_1 we have $\frac{E_1}{E} = \frac{H_1}{H}$

$$\therefore \frac{E_1}{E} = \cos A^\circ \frac{v^2}{v^2 + R g \sin A^\circ}$$

or

$$E_1 = E \cos A^\circ \frac{v^2}{v^2 + R g \sin A^\circ}$$

or in other words the elevation required when firing down-hill will be equal to that required on the level multiplied by the cosine of the angle of the slope, and by the fraction $\frac{v^2}{v^2 + R g \sin A^\circ}$

Similarly E_2 , the elevation required when firing up-hill will be equal to

$$E \cos A \frac{v^2}{v^2 - R g \sin A^\circ}$$

The practical calculation of these quantities can be performed by a clinometer which I proposed at the end of 1887. An inspection of it will show that the value of $E \cos A^\circ$ (which is the base of a right angled triangle of which E is the hypotenuse and A° the base angle) is given at once by the clinometer, while the corrections due to the fraction $\frac{v^2}{v^2 + R g \sin A^\circ}$ are given in the table on the back of the gauge.

The value of this fraction was found to decrease from .994 at 400

yards range and 10° of slope, to .908 at 1,000 yards range and 60° of slope.

This fraction being less than unity the correction in the case of down-hill firing is subtractive.

Similarly for up-hill firing the correction due to the fraction $\frac{v^2}{v^2 - R g \sin A^\circ}$ is additive.

The excess of the latter fraction above unity is so nearly equal to the defect of $\frac{v^2}{v^2 + R g \sin A^\circ}$ below unity, that for the sake of simplicity one

set of corrections are given for the two cases.

The clinometer thus practically calculates the value of the expressions $E \cos. A \frac{v^2}{v^2 + R g \sin A^\circ}$ and $E \cos. A \frac{v^2}{v^2 - R g \sin A^\circ}$ for each range and slope. The only things which have to be ascertained independently being E, the elevation that would be required for the same distances on the level.

The principle of this clinometer has met with a good deal of criticism, to which the best answer I can give is to compare the results of the actual practice carried out, to which I have referred, with the results given by the clinometer.

The ranges experimented on were:

Down-hill at Kaithu.

A.	715 yards at a slope of.....	26°	46'
B.	1,110 " " " "	24°	35'

Up-hill at Sanjauli.

C.	850 yards at a slope of.....	27°	52'
D.	960 " " " "	28°	45'

It was found impossible at Simla to obtain steeper slopes of sufficient length.

The elevations are expressed in hundredths of an inch, as they can thus be easily applied to any rifle by an ordinary vernier.

It must be remarked that the elevations spoken of are the total height of the back-sight above the top of the fore-sight, while the ordinary verniers are graduated from some higher point. The difference for any vernier can be found by measuring the elevation for 1,000 yards given on the back-sight of a H. M. rifle, the amount of elevation shown deducted from 125, (the total elevation of the 1,000 yard line above the fore-sight) will give the correction to be applied to all readings of that particular vernier.

Now the correct elevations for level ranges of the same length as the above sloping ranges were found from a series of experiments on the measured ranges at Annandale to be

71.9
134.8
90.34

and 107.28 hundredths of an inch respectively.

The elevations for these distances on the respective slopes down-hill for A and B, and up-hill for C and D were calculated by the formula given above to be

61.83

115.47

83.61

and 99.17 respectively.

and the elevations found by independent experiment on these were found to be

63.62

113.70

83.35

and 98.10 respectively.

The error in each case being

— 1.79

+ 1.77

+ 0.26

and + 1.07 respectively.

these errors are equivalent at the target to errors in elevation of

— 1.6 feet

+ 2.2 “

+ 0.2 “

and + 1.3 “ respectively or to errors in

range of

— 12 yards.

+ 9 “

+ 1.7 “

and + 7 “ respectively.

Which are errors that might be caused at those distances by a slight change in the wind or the light.

I do not suppose for a moment that such accuracy in the adjustment of the sight or anything approaching to it would be possible on service. All I propose in this paper is to draw attention to the law in accordance with which the sighting of the rifle is affected by the elevation or depression of the object above or below the firer and I think it will be admitted that a knowledge of the law, even approximately, cannot fail to increase the effect of fire on steep slopes, especially at long distances, and in cases where the fall of the bullets cannot be observed.

THE DESIGN AND ARMAMENT OF COAST BATTERIES IN FRANCE.

(Extract from the Royal Engineers' Journal of December 2, 1889.)

WITH reference to recent discussions in the public press in this country on the questions of coast fortification, it may be of interest to publish the following notes from a remarkable series of articles by Captain V. Fabre, of the French Artillery, which appeared in the *Revue d'Artillerie* in 1886-87.

The writer has, since 1886, been one of the officers specially charged at the French War Office with coast defense, and it is believed that recent modifications in the system of coast fortification in France are in harmony with the views which he has put forward in these articles.

With the object of defining the *rôle* and method of employment of fortification in coast defense, he first examined, from a theoretical point of view, the general conditions of fire from batteries, and specially the influence of altitude on their offensive power. He then carefully reviewed the various types of war-ships belonging to the Great Powers, which might take part in coast warfare, examining more particularly their defensive qualities. And he arrived finally at certain conclusions, of which the following is a brief summary :

1. THE GENERAL CONDITION OF THE ATTACK AND DEFENSE OF COASTS.

Enterprises against a coast line are of two sorts, which differ according as their object is to effect a landing or a bombardment.

The development of modern armies, and the facilities of concentration afforded to the defender by the new rapid means of information and communication, have deprived the landing of troops of a great part of its former strategic importance.

It is not so, however, as regards a bombardment, which the progress of artillery renders daily more formidable for the military and commercial establishments of the Littoral.

The protection of the maritime frontier is confided, in the first place, to the squadrons and mobile sea defenses as a general means of protection against any sort of attack ; next, to the mobile land forces against any attempt to effect a landing ; and lastly, to the fixed defenses by land and sea against a bombardment.

2. THE RÔLE AND VALUE OF COAST FORTIFICATION.

Coast fortifications constitute the only really efficacious and certain means of protection against bombardment. They are therefore indispensable round military and commercial ports exposed to attack from the sea, and it is advisable to extend their employment in proportion, as by improvement in the means of attack, a greater number of points are threatened.

3. ARMAMENT OF BATTERIES.

It appears that the armament of coast batteries should comprise four descriptions of ordnance:

(a) Battering guns (*canons de rupture*) capable of perforating the heaviest armor afloat. Calibre, 34 cm., or 13.385 inches.

(b) Bombarding guns (*canons de bombardment*), intended to act against the exposed parts of a ship and against armor of inferior thickness. Calibre, 24 cm., or 9.445 inches.

(c) Rifled mortars for the attack of armored decks. Calibre, 32 cm., or 12.597 inches.

(d) Light guns intended to counter-batter the quick-firing artillery of the ships, to protect the batteries against attempted landings, and to act against unarmored ships of small size and great speed. Calibre, 95 mm., or 3.74 inches.

As regards the proportion of these four descriptions of ordnance, it is necessary to take account above all of the fighting distances. Up to 1,500 or 2,000 metres the accuracy of fire is very great, and almost the same for both ships and batteries; consequently the latter can and should have recourse to a battering fire (*tir de rupture*) in order to fight on equal terms with the ironclads. But beyond this distance battering fire becomes impossible owing to the small amount of armored surface opposed to it and the diminution in the *vis viva* of the projectiles. It is in that case necessary to make use of bombarding guns and rifled mortars.

Hence the necessity of having two sorts of batteries; the one intended to act up to 1,500 or 2,000 metres—these are the battering batteries (*batteries de rupture*), armed with ordnance of the first category; the other, of which the action is intended to reach beyond 1,500 or 2,000 metres—these are the bombarding batteries, armed with ordnance of the three last-named categories.

4. COMPOSITION OF THE BATTERIES.

In the case of battering batteries, the rapidity of the fight makes it necessary to dispense with careful laying, which, besides, is unnecessary owing to the accuracy of the ordnance at the short ranges in question. The guns will fire independently, and their number and distribution can be fixed arbitrarily.

On the other hand, in the case of bombarding batteries, where the ranges are not limited, and in which the number of shots fired is relatively considerable, the success of the firing depends principally on the laying, which implies the collection of a certain number of guns of the same calibre and of the same pattern. Each battery, or fraction of a battery, placed, as regards the firing, under a single direction, will consequently form a homogeneous group composed as far as possible of four guns, having a common field of fire of at least 100 degrees.

In the association of the three descriptions of groups representing the constituent units of these batteries, whilst taking account of the local conditions and necessities of the defense, it is necessary to consider the greater importance of bombarding guns, and the generally useful character of light guns.

The choice of the description of projectiles to be employed in each particular case ought to be subordinated to the defensive organization of the vessel fired at. It is therefore essential that battery commanders should have at their disposal tables of information and drawings enabling them to recognize at least the type of vessels in sight.

5. CARRIAGES.

Carriages for coast-defense guns should all allow of their guns returning automatically into the firing position, after a shot has been fired.

It is also desirable that the individual who lays the gun should have within reach special means of regulating lateral and vertical movements.

The maxim depression which should be arranged for in the case of 24 cm. guns should be from 5° to 7° , and in the case of 95 mm. guns from 12° to 15° .

All the carriages should be provided with bullet-proof steel-plate shields for the protection of the gun detachments.

6. THE ESTABLISHMENT AND ORGANIZATION OF COAST FORTIFICATIONS.

A.—Important points, such as great military and commercial ports exposed to regular attacks, require :

(1.) The defense of the immediate neighborhood of the position, at the entrance, channels of approach and interior ports and roadsteads by means of battering batteries (*batteries de rupture*).

(2.) Exterior defense, embracing all the sea surface from which it is possible to bombard the position by means of bombarding batteries.

These batteries, erected on heights, if the country along the coast line permits, will be invulnerable at close ranges; and, if the coast-line is low-lying, they can be protected from attacks at close quarters either by providing them with armor, or by erecting between them armored battering batteries.

B.—Secondary points, exposed to the assaults of isolated vessels of the second or third class, require for their protection two or three bombarding batteries armed with guns of medium and small calibre.

Generally, when recourse is had to armor-plating, costly constructions, such as movable turrets and armored casemates, will be avoided, except where attacks are feared on the flank or in reverse; it will be sufficient to have an armored straight wall.

As for open batteries, whether in earth or masonry, they will be able to fight successfully at long ranges against ironclads, provided that their epaulments have sufficient resistance, and that they are almost wholly defiled from view from the sea.

Earthen epaulments should be about 12 metres (40 feet) thick; but it seems that the only means of rendering them really impenetrable to shells of large calibre is to cut them out of the natural earth.

Powder magazines should be constructed underground if possible, either inside the work or outside.

In no case should the walls be exposed to view from the sea.

Care will be taken to conceal from view all the details of construction of the batteries by the suppression of projections and sharp lines in the earthwork, and by plantations on the exterior and superior slopes.

G. A. K. WISELY, Captain, D. A. A. G.

LETTERS ON INFANTRY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by LIEUT. ODON GUROVITS, 11th U. S. Infantry.

VIII.

BATTALION DRILL.

IN my previous letters I endeavored to explain the object of the various stones entering into the foundation of a handsome edifice, which represents our infantry; to-day I reach the main story—the companies formed into a battalion.

We have in our battalion drill the simple, elementary movements of the drill tactics and the movements incident to the fight. Those relating to the fight are so elastic that they may be adapted to every possible condition and are not only entirely sufficient, but could hardly be better devised to give the essential principles as well as ample play for the originality of the leader and also to allow the full development of the sub-leader's sphere so very necessary with the new method of fighting in dispersed order. No matter how often I pored over these regulations, I never could but admire the spirit pervading them, which is expressed to its fullest extent in par. 112 to 127 (the latter, though given for the brigade, is also valid for the battalion). Nevertheless, one very frequently finds that the most important paragraphs of the regulations are not observed at drill. On the contrary, as the years remove us farther from the experience of the latest war, our battalion manœuvres become less assimilated to actual war conditions, owing to the rigid adherence to a customary form or pattern on the drill ground, *unless the inspecting officers work constantly against such rigidity and insist that the forms be considered secondary and that they be in conformity with the spirit intended.* But this is extremely difficult to attain, because this adherence to form and system are not due to the idleness but to the highly strained zeal of the battalion commanders.

In addition to this, the very method in which the battalion commander conducts his battalion instruction tends to remove that method from the conditions met with on the battle-field. This appears to have its origin in the zealous endeavor to bring the battalion up to a high degree of excellence.

To support my assertion I shall mention a few detailed examples.

The regulations, page 152, say explicitly : That, when within the effective fire of the enemy, the employment of the battalion column can be justified only by extraordinary circumstances. Yet, during the greater part

of the time at battalion drill, when the deployment of the firing line from the battalion column is ordered and executed, one very frequently sees the skirmishers early engaged in a fight while the battalion in column is in such close proximity behind them that it would be unavoidably drawn into the fight on that account. At most it is attempted to advance the companies from the flanks, endeavoring to approximate the model pattern by bringing the companies of the centre up exactly behind the centre of the interval. It is permissible to advance any one company and as many of them as desired, yet, this and the various methods permitted by par. 111, as well as by the definitions of par. 112, are made use of but very seldom. Occasionally at the close a few movements are executed with companies in two or three lines, but without demonstrating how this would be applied in a fight. Observe the very simple manner in which a firing line, lying down on the ground, may be reinforced. According to the regulations order should be preserved, the men pertaining to different subdivisions should not be mixed up. In case a subdivision advances in open order with a view to reinforcing skirmishers in the firing line, it usually happens that the skirmishers at that point rise, and, moving to the right and left, make room for the new subdivisions. How would it be possible to execute such movements if the firing were so well directed that reinforcements became necessary? Would not the suddenly rising skirmishers be sure victims of the enemy's projectiles? Could not the first units sent out from the main body in swarms, leave between their subdivision the intervals required later for reinforcements?

Would it not, for this reason, be easier to keep the fire under better control, the men not being extended over so much ground and therefore easier commanded? Would not the different swarm-units, if a good cover presented itself, be more quickly assembled behind such cover? These faults are best observed when several battalions are in line near each other in the brigade. In such a case we find that the skirmishers are instructed to cover the entire front and are directed to increase the distances between men so that the entire front may be equally covered, as if it would be a great misfortune should it happen that an interval of 200 paces were left open between two platoons swarming out in dispersed order—as though an enemy could possibly break through such an interval. Consequently, the distance between files often exceeds 10 paces; the regulations, however, say that six paces per file or *three per man* are the maximum intervals allowed. Again, does one ever see the battalion commander leave it to the judgment of the officers in the firing line to order, as the particular stage of the fight might demand, individual, rapid, or volley fire, or to determine the number of rounds to be fired? Or does he ever allow the companies ordered to advance as supports to take such column or line formation as the circumstances may require? Does he not prefer, in order to maintain uniformity and nice appearance, to compel all companies to advance in the same order? In a real fight, however, is he ever enabled to order anything of the kind?

As to the stereotyped manner of executing manœuvres, caused by the regular shape of all the drill grounds, which very frequently prevent the

execution of the contemplated formation in any but a mechanical and much repeated fashion, I shall mention but one case. If the battalion be in dispersed order in the fighting line and the assembly sound to form in column on the centre, as usually happens before dismissing, it will usually be dressed, to face one of the sides of the drill ground because it will march past in review. A battalion, therefore, is seldom practised in assembling quickly on an oblique front, and it usually causes embarrassment and delay should an order be unexpectedly received to assemble facing that church steeple or this poplar tree. To do this rapidly is a necessary feature of practical instructions, and if it be neglected it will take too much time and cause unnecessary fatigue to the men, to place masses quickly according to the ground, for example, behind an elevation under cover.

There are innumerable drill-ground customs, not to speak of aids and tricks all impracticable in war, yet conducive to a more exact and pleasing show drill.

Every military man is familiar with them, I do not wish to weary you by an enumeration, but will proceed to the actions and conduct of the battalion commander.

At the beginning of the fighting drill, you will observe the battalion commander stop near that skirmisher who fires the first shot, and who for that purpose, lies down to get cover. The battalion commander during all this time, remains mounted, but should he suddenly remember that he never could take that position in action, he will only retire a short distance towards the support. From thence he gives his commands and orders signals. If it is intended to execute a new movement, a flank attack or to reinforce a part of the fighting line, he will almost invariably go in person and superintend everything himself. This is especially so if a mistake is made, an order misinterpreted, a wrong fire employed, or something else done not in accordance with his ideas. Hundreds of times in one hour would he have to be pronounced *hors de combat*. He was everywhere except at that place where he should have remained during the entire fight, *i.e.*, with that company, which he retained as a last reserve, and with which he enters the firing line. Otherwise he would give up the lead and control of the battalion at the very onset. These extreme cases taken from life on the drill-ground create dangerous illusions in the minds of those who have never witnessed the realities of the field of action. They think that such *is* reality, and when in action time and space are not adapted to the calculations made and taught on the drill-ground, then many a one loses his self-control. More yet, the men accustomed to see the major on the drill-ground, constantly at the head of the troops put him up to ridicule when he remains at the rear with the reserve company as soon as the bullets begin to whistle; and, as a consequence, the field and general staff officers,* at least in the first battle, continue to ride where they did during peace in order to avoid such ridicule.

About 1850, a general of high grade and an old fighter of the Wars

* *Advisory officers.* Whenever "general staff officer" appears in the text of any of these letters, the above, might be substituted for information of such readers who are not yet familiar with the duties and functions of that officer in the German Army.

for Liberty, in one of his criticisms, censuring such irregularities, said with his peculiar sarcasm, that he believed the first ball cartridge fired would restore the proper condition of things.

But he was mistaken, for during the battle of St. Privat, the field and general staff officers actually rode where they were accustomed to ride in peace, and as a consequence, on the day following that battle but a small fraction of these officers and the adjutants of the infantry of the Guard, were available for duty. The majority were dead or wounded. That was very honorable, but unnecessary and, as far as Army and Fatherland were concerned, of the gravest consequence.

While discussing these questions around the green table* everything seems to be as clear as daylight, and one is astonished that such a condition of affairs as related can occur at all. Yet they do occur very frequently, and there must be some underlying causes which are well worth while to investigate, should it be deemed desirable to avoid their serious consequence. Among others we will refer to the fact that the battalion commander when he begins the drill mentioned, cannot very well remain at the place where he should be during an engagement, *i. e.*, with that company which he desires to engage last of all in the fight. He has occasion almost every instant to instruct and correct, and must ride hither and thither, and, should it be his intention to proceed to his proper place, some occurrence in the firing line will certainly require his presence there. Therefore, he prefers to remain with the firing line. Theoretically it would be better if he should let the faults pass by unnoticed until after the drill, and then correct and instruct, or do so during the time given for "rest." But this is not practicable. He would then find so much to correct that he would frequently have to interrupt the drill in order to lecture the assembled officers, and might be tempted to postpone his remarks until the following morning before marching out, when, after finishing his lecture, he would find that the time allotted for drill had been entirely taken up by his remarks and that he would, therefore, be obliged to dismiss his men for their noon meal. I once witnessed such an occurrence myself. Furthermore, a short remark made immediately after a mistake occurred is much more instructive than the most elaborate, theoretical explanation made some time after the occurrence. Again, if the battalion commander wishes to rectify every error he can do so only by being near the firing line. As an example, I mention, that he cannot observe wrong pointing and cannot hear commands given for wrong kinds of fire, if he be in his proper position. Thus it occurs that the battalion commander in the first few days allotted to the fighting formation and drill must remain where he never could be in action, and it finally becomes a habit with him to be there. The only day when he will move around as required in action is, therefore, the day of inspection. But it is asking too much of any man to do away on this one day, with everything, which by that time, has become habitual with him. Moreover, will he, for that day when he has to show how much he has taught his men, and is, therefore, anxious that no mistakes occur, adopt a method of giving orders alike new to himself and to the battalion?

*Table at which military topics are discussed and Kriegspeil played. *Translator.*

You might answer to this effect: That the battalion commander could, when he instructs in the preliminary principles, go wherever he chooses, but that during the latter half of the time allotted to the fighting drill, he should be compelled to remain in his proper place for action. This is a very nice proposition but impracticable. The time for battalion-drill is so short that the commander must be satisfied if he succeeds in going over once everything contained in the tactics referring to battalion drill. He cannot, therefore, divide the time into two parts; the one for instruction in elementary principles, the other for application. Consider also that if from the three weeks allotted to battalion drill, we deduct Sundays, holidays, days for the performance of guard, garrison and fatigue duties, but ten remain for drill—and that is considered a very favorable proportion. Those battalion commanders who adopted this method of instruction surely had but two days left for real practical instruction in battalion drill, *i. e.*, the day of inspection and the one preceding it. Then it certainly happened that on the day preceding inspection, he practised only those manœuvres which he desired to execute the day of inspection, and as a consequence, the inspection was finally converted into a theoretical performance or military ballet, thus losing its value as an inspection for warlike preparation. This inclination of the battalion commander to be everywhere in person and to superintend everything is further brought about by the inspecting officers holding the battalion commander responsible for every mistake made. A few remarks made by the inspecting officer, such as: "Do you observe, Major, how that Xth company takes position?" or "The skirmishers of such company advance at double time: that is wrong." And the major will gallop from one platoon to the other in order to prevent the recurrence of what displeased the inspector. It also happens that many battalion commanders, in drilling their battalion, rarely ever go beyond par. 77 to 98 of the fighting tactics and but seldom attempt to practice the fourth part of these tactics.

If he succeeds in executing these paragraphs with precision and excellence, then the battalion makes a favorable impression upon the inspector and the mistakes and omissions of the fourth part are passed over altogether by the inspector, or else looked upon with less severity. This, however, takes us back again to machine ideas and to "shock tactics," which are impracticable since the introduction of improved fire-arms and will finally result in nothing save the unnecessary slaughter of masses. I have often heard bitter complaint made about that superficial, showy preparation going on for the inspection. But, if ever a reproach was unjustified, this is one; because the efficiency of a body of troops depends upon the result attained when the aim of the battalion commander is reached, and also upon the discipline and obedience consequent thereto, not that blind obedience, executing nothing but what has been ordered and always waiting for orders, but upon that obedience, which meets half-way the ideas of superiors—always trying to foresee them with a view to understanding thoroughly their spirit. Therefore, any one who prepares his troops in such a manner that it is pleasing to superiors, is not currying favor, but shows that he possesses the spirit of obedience which made our Army great.

I have, however, witnessed amusing incidents owing to the desire to personally superintend and order everything. I think that I have previously mentioned to you that during a skirmish of a reconnoitring battalion I observed the division, brigade, regimental and battalion commanders all remain with the foremost firing line. They were accompanied by their staff and a reigning German prince. Being accustomed at inspections to order and superintend everything in person, and also to act upon the principle that the battle is but the highest order of inspection, they acted as accustomed during peace. On another occasion a division advanced in close column against the enemy.

The division commander, with the brigade, regimental and battalion commanders of the leading brigade, again rode immediately behind the vanguard; and the first man wounded was a trooper detailed as orderly, who dropped from his horse, having been shot in the breast while riding behind the general.

Disregarding the fact that this leads to an unnecessarily great loss among the higher officers, and also loss of control and coherency, such conduct has additional disadvantages. Every man has but a fixed amount of physical and nerve force. If any one expends his physical power before it is required he runs the risk of lack of power at the decisive moment.

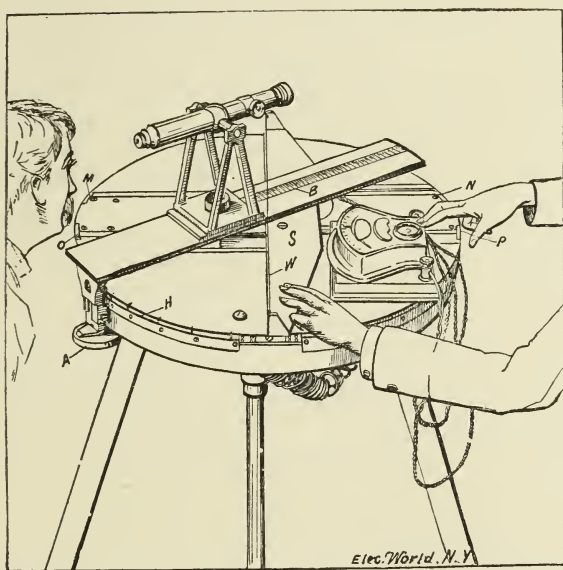
The same remarks are applicable to the nervous system. None of us are altogether indifferent to death, it is simply our nerve power which gives us sufficient self-control to be fearless in times of danger. That commanding officer who enters the firing line earlier than necessary, runs the risk of lacking nervous and physical power at the decisive moment. This is not due to sudden cowardice, but to the strained nerves which cease to act in sympathy. Gradually he is overcome by nervous prostration and mental weakness; doubts begin to bewilder him in the shape of tactical and strategical reflections, which convince the leader that all the rules of the Art of War now demand is a waiting attitude, or the defensive; to refuse the centre and other nice scientific formations. We have such a case in a commanding officer, who remains with the leading skirmishers from sunrise to noon, who hears the bullets whistle around him for five or six hours (the advanced guard battalion being employed in thrusting back the hostile outposts) and who finally arrives where the enemy in a well-selected position, awaits the attack. The enemy, not having time to retire in good order, is forced to await the attack; but the commanding officer making the attack is suddenly led to believe his men too tired, he himself being tired out (the fact of the case is that the attacking *battalion* is the only one that is tired), and so believes that his men, having been under fire five or six hours, have done their duty for the day. Then he resolves to postpone the attack until to-morrow, by which time the neighboring divisions will have arrived, therefore, he posts his outposts and lets his division rest for the day. The enemy, however, taken by surprise in the attack of the morning is again surprised, but very agreeably, however. He finds time to withdraw without loss and avoids the threatened catastrophe. Had the leader in question rested longer, had he not expended his energy by staying six hours in the skirmish; had he at that moment, when he ordered the fire to cease, arrived at the place with

the main body, he himself full of vigor, he probably would have considered that nothing at all had as yet been done, and would certainly have ordered the general attack.

Thus eagerness and overzeal to conduct everything in person on the part of a commanding officer may at times be the real reason for absence of energy; and the too early exposure, the cause of a hesitating method of attack. Towards the close of our last campaign such irregular line of action on the part of leaders while engaged in a fight ceased entirely. After the war it was not even to be observed on the drill grounds. But in a short time it again made its appearance. The longer peace is preserved the more it threatens to again become a habit. This is caused by the Service, in time of peace, looking upon a successful inspection as the mark to be attained as well as by the gradual removal of our experienced officers from active duty. "Experience in actual campaigning has but a limited value," says a certain theoretical authority on the Art of War, much to the general amusement. But in a certain measure he is right. Each grade gathers experience in a war only in the duties of that grade and probably the grade immediately above it. Thus, a company chief, within his own sphere and that of a battalion commander, but not within that of a regimental or brigade commander. There are exceptions viz., the young officers (general staff officers) who learned to regard war from the standpoint of the higher officers (generals or division commanders) and who saw war with open eyes. Now, after thirteen years' peace, the promotion having gone on regularly, I wish, for the welfare of the younger generation, that we might even have no more battalion commanders who led a company during the last war.

How could a lieutenant who commanded during war only a platoon gather sufficient experience to know how to act as a battalion commander? If he is required to command a battalion, he will lead and instruct it so as to be successful at the inspection.

Knowing the inclination towards unwarlike instruction of the battalion towards stiffness, towards irregular conduct, and towards an impossible method of giving instructions, the next question is to find out how to guard against such irregularities. I shall entertain you in my next letter with this question in order to prevent this letter from becoming wearisome. I shall, however, state to-day that at the inspections, drills and manœuvres it should constantly be insisted upon that the leaders, including those of the lower grades, remain where they must be in action.



LIEUT. FISKE'S RANGE AND POSITION FINDER.

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IN gunnery practice, the success obtained depends, evidently, upon the accuracy with which the distance of the object fired at is judged by the gunner. In order to obtain greater accuracy in firing, therefore, independent of the mere judgment of those handling the guns, various means have been proposed in the past and some, indeed, applied to a limited extent. Among these we may mention the plane table method, by which two observers stationed at the ends of a known base line obtain the angles at their respective points between the base line and the object to be fired at. The angles thus obtained are plotted on a plane table and the distance determined by scale measurement. This requires some method of communication between the two observers at the end of the base line, which, in the past, has usually been done by flag or "wigwag" signals, or, in some cases, by means of a telegraph line connecting the two observers. The method in either case is a tedious one, and hence other means of accomplishing the object have been sought. But for ships the problem of range finding has heretofore been considered almost unsolvable.

A splendid solution of the matter has, however, recently been achieved by Lieutenant Bradley A. Fiske, of the United States Navy, and as his new range finder marks a decided departure in this important field, and involves a beautiful application of electrical principles, we propose to give our readers a complete description of it.

Before entering into the actual construction of the apparatus it will be well to fix in the mind of the reader certain preliminary principles involved. Thus in Fig. 1, let $a b c d$ represent the four members of an ordinary Wheatstone bridge, and g the transverse member, in which is connected the galvanometer g' . A battery f is also connected to the bridge in the usual way. In the members c and d are placed the fixed resistances c' and d' , and in the member b the variable resistance b' also, as usual. One wire from battery f , however, connects to the end of member c , and also to the pivot l of a swinging arm i . The extremity k of arm i moves over and maintains electrical contact with an arc h of conducting material, which has one extremity j connected, as shown, to the member a of the bridge. It is obvious that when the arm i is in the position shown in full lines in Fig. 1, then the current will traverse the whole arc h , and when the arm is in the position indicated by dotted lines, then the arc h will be cut out and the current will pass directly to member a . Now, let us assume the arc h be made of such material and so proportioned that its electrical resistance to a current traversing it will be proportional to the length of arc included between the contact end k of arm

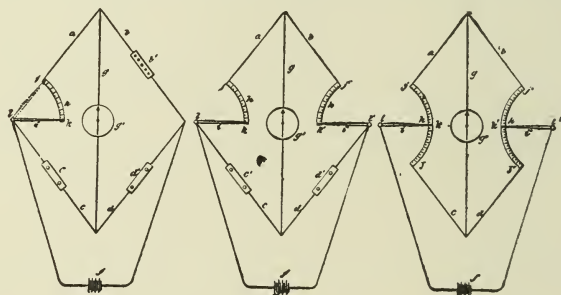


FIG. 1, 2, 3.

i and the connecting point j of member a with the arc. Therefore the resistance interposed in the member a of the bridge will be commensurate with the angle jlk , and if this resistance be known the angle is also known. Let it now be assumed that the galvanometer g' and variable resistance b' be located at some point distant from the moving arm i , from which the arm is invisible or inaccessible. Clearly, then, an observer stationed at the galvanometer g' and resistance b' can, by noting the galvanometer and adjusting the resistance in the usual way, determine the resistance equilibrating any position of arm i along the arc h , and so discover the angle of adjustment of the arc; or, having adjusted the resistance b' at some given figure, the observer may, by simply noting the galvanometer, determine when the arm i is placed at a desired angle corresponding to the adjusted resistance, and this indicating device may obviously be at the place where the moving arm is located, so that the operator there may thus know when he has placed the arm at the predetermined point or at the distant station; in the same way the operator in charge of the resistance b' may know that the arm has been adjusted properly; or two indicating devices in the same circuit may give warning to both operators simultaneously.

Various practical applications of this apparatus will readily suggest themselves. Thus, for example, the elevation or training of a gun may be determined or recognized from a distant point, the longitudinal axis of the gun corresponding to the arm i .

Referring now to Fig. 2, it will be apparent that in lieu of the variable resistance b' in the member b there is arranged an arc h' and swinging arm i' . The arc h' is connected at one end j' to the member b , and the swinging arm i' makes contact at one end k' with the arc, and to its pivot l' is connected the member d . The arrangement and construction of arc h' and arm i' are similar to that of arc h and arm i . Consequently when the arm

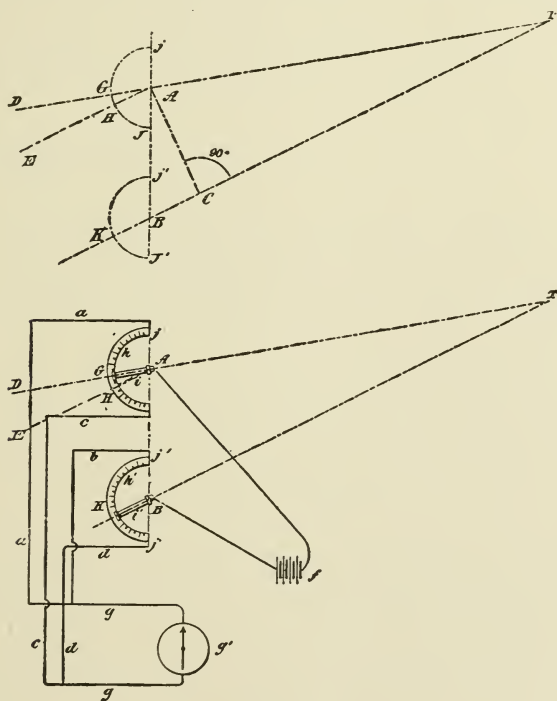


FIG. 4, 5.

i is set at a certain point on the arc h the arm i' must be set at the corresponding point on the arc h' , in order that the resistance of the lengths of the arcs h h' , respectively, between the point k and point h and point k' and point h' may balance; hence if the arm k be set at a certain angle the observer at arm k may recognize that angle by noting the position of the arm k and the galvanometer, as before. It will be observed, however, that the effect of moving the arm i over the arc h is practically to lengthen or shorten, or to interpose more or less resistance in, the member a of the bridge, and by operating the arm i' a like effect is produced in the member b . The resistances or lengths of the members c and d remain unchanged.

Referring now to Fig. 3, there is shown the arrangement which forms

the specific basis of Lieutenant Fiske's invention. Here the arc h is connected at its respective ends jJ to the members ac and the arc h' is similarly connected at $j'J'$ to the members bd . The battery wires connect to the pivots ll' of the arms ii' , as before. Now, when the arm i is moved from its middle position on its arc toward j , less resistance is caused in the member a and more resistance in member c , and when moved in the opposite direction the reverse occurs. So, also, a similar effect is produced by moving arm i' , and thus the resistance offered by all four members of the bridge may be affected instead of that due to only two of them, and differential results may be obtained, as will more fully be apparent in the following description of the device for measuring distances.

Referring to Fig. 4, let T be the position of the object, the distance of which from the point A it is desired to ascertain. Let AB be any short base line. Draw AC at right angles to BT , EA parallel to BT , and prolong AT as to D . By trigonometry

$$\left. \begin{array}{l} AC=AT \sin ATC \\ AT=AC \operatorname{cosec} ATC \end{array} \right\} \text{ and } \left\{ \begin{array}{l} AC=AB \sin ABC, \text{ whence} \\ AT=AB \sin ABC \operatorname{cosec} ATC. \end{array} \right.$$

AB being the measured base line, is known, and the angle ABC at the point of observation is easily determined, so that the angle ATC remains to be found; but $ATC=DAE$ and DAE is subtended and measured by the arc GH . Arc $GH=\text{arc } jH - \text{arc } jG$, and $\text{arc } jH=\text{arc } j'K$; hence $\text{arc } GH=\text{arc } j'K - \text{arc } jG$.

In Fig. 5, the diagrams Figs. 3 and 4 are combined, ii' , as before, being swinging arms traversing the arcs $h h'$, and the connections $abc d$ of the bridge being present also, as before. Let the arms i and i' represent telescopes, both directed upon the object T . The arcs jG and $j'K$ not being equal, the bridge will not balance; but when the telescope i is moved to the line EH then the bridge will balance, but the distance thus moved is the arc GH , the length of which may be read off from the arc h itself. It will be seen, therefore, that the operation of determining the distance AT becomes, by the aid of this apparatus, exceedingly simple. The observers at the respective telescopes i and i' direct their lines of sight upon the object. The observer at i notes the angle jAG or length of arc jG . He then moves the telescope i until the galvanometer g' , which is placed conveniently near his position, shows no deflection and notes the angle jAH or length of arc jH . The difference between the arcs jG and jH equals the arc GH , whence the angle ATB , and hence the distance AT , is found by the observer at the arm i , or, in other words, by an observer at the base line. The disposition of the apparatus, whereby an observer at a point distant from the base line may at once read off the distance AT from a suitable scale will now be explained.

Referring to Fig. 6, the members a and b of the bridge are connected to opposite extremities of a bar mn of conducting material, and the members $c d$ are connected to the extremities of a similar and parallel bar op . Adjustable upon these bars is a slider rr' , having a middle portion s of insulating material, so that the current from bar mn , for example, does not pass across the slider rr' to bar op , but proceeds by the wire g through the

galvanometer g'' , which here takes the place of the galvanometer g' in the preceding figures.

Suppose, now, that the telescopes i and i' are sighted upon the distant object T , as before, and that the slider r is at the middle point 1 of the parallel bars $m n$ and $o p$. The resistances in the bridge will obviously not balance, and the galvanometer will be deflected. It has already been explained in connection with Fig. 5 how, by moving telescope i to the point H , the resistances might be balanced, and if that were done, with the arrangement shown in Fig. 6, the fact would obviously be indicated by the galvanometer standing at zero; but, now, let it be assumed that the telescope i , after being sighted upon the object T is not moved, or, in other words, that the observers respectively at the two telescopes i and i' simply adjust their instruments in line with T . Obviously, then, the distance of the bridge r to G (member a) is less than the distance from r to h (member b) by the length of the arc GH . Similarly the distance on the bridge from r' to G (member c) is greater than the distance from r' to h (member d) by the length of arc GH .

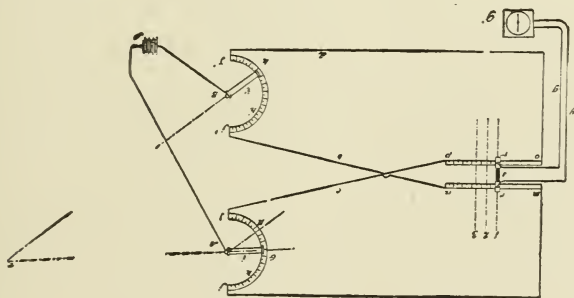


FIG. 6.

Now let the resistance per unit length of the bars $m n o p$ be made equal to or with some definite relation to the resistance per unit length of the arcs $h h'$, and lay off on bar $m n$ a distance of $r 3$, and on bar $o p$ a distance of $r' 3$, these distances being such that the resistance due thereto will be equal to that of the arc GH . Clearly, if the end r of the slider be moved to the position 2 on bar $m n$, the member a will be increased and the member b will be diminished by the distance $r 2$, which offers a resistance equal to one-half that of arc GH , and if the end r' of the slider be moved to the position 2 on bar $o p$, then the member c will be decreased and the member d increased by the distance $r' 2$, which also has a resistance equal to one-half of arc GH . As both ends of the slider move simultaneously, it follows that when its extremities are adjusted to the position 2 then the bridge will balance and the sound in the telephone will cease. Applying this practically, let the bars $m n o p$ be laid off in suitable scale divisions from r to n and i' to p . The two telescopes i and i' being sighted on the object, the distant observer observes the galvanometer g'' and moves the slider $r r'$ along the bars $m n o p$, until the needle marks zero. The scale marked on the bars then shows an indication corresponding to the length of arc

GH , or the actual distances corresponding to such indications. This scale is on the same bar with the telescope, so that the distance indications are corrected automatically for the expression $\sin ABC$ in the formulas above.

To illustrate the practical application of the apparatus, the following instance may be given: The telescopes $i\ i'$ mounted upon their arcs $h\ h'$, are given to two observers, who proceed to a skirmish line, or to any other advanced position, and, selecting a base line of predetermined length, train their instruments upon any desired point of an enemy's works or column. The fact that this is done may be indicated by a flag signal, or by one sent electrically to the rear over the bridge connections. The observer at the telephone, g'' may be supposed to be stationed in proximity to a battery of guns ready to open fire. As soon as the signal is sent that the telescopes are sighted the observer at the galvanometer adjusts the slider $r\ r'$ until the needle stands at zero, and then determines the range from the marks on the bars $m\ n\ o\ p$, when the guns are laid accordingly.

But it is on board ship that the device obtains its greatest value, and a set of Lieutenant Fiske's apparatus is now nearing completion at the works of the Western Electric Company in this city, and will shortly be placed on board the U. S. S. *Baltimore*. Our illustration, Fig. 7, shows the range finder as it actually appears. The adjustable resistance wire is placed in the groove H , and the bridge wires $M\ N\ O\ P$ are traversed by a slider S which carries a cross wire W . When the galvanometer, which is of the Weston pattern, stands at zero, the distance of the object sighted at can be read off directly on the scale B .

A large number of tests made with the instrument show that its accuracy is within a fraction of one per cent., which is much greater than that of the gun itself.

Military Notes.

MODERN DRILL AND TACTICS.

FEW officers have as yet realized what a vast revolution in the tactical instruction of the soldier on the continent has of late years taken place, or how rapidly time-honored customs and conventionalities are disappearing from the parade-ground. We Englishmen, despite all the Radical rubbish that is nowadays noisily hawked abroad, are true Conservatives, and in no country does an old institution or familiar piece of pedantry die more stubbornly. It is true that we occasionally break out in a fit of reform, and make a vast show of a freedom from prejudice, but the demonstration is only on the surface, and the experienced official laughs in his sleeve, and knows full well that, when the periodical hot fit is over, the deep waters will settle down once more and flow again with placid unconcern in their accustomed channels. In the Army our energetic attacks usually supervene on a similar outbreak abroad, and, therefore, when we hear of a new drill-book or alteration in tactics in France or Germany we may safely prognosticate a visit to these shores of the epidemic, yet may take consolation in the thought that the malady will with us assume a milder form, and will not only be less acute, but will make a shorter stay with us. Thus lately, when Germany and France have overhauled their drill regulations, we likewise follow suit, and alter not only our infantry, but our artillery drill also. Yet even while we do so, we are, as it were, amazed at our own recklessness, and would be afraid at our rashness were we not reassured by the undercurrent of feeling which whispers that after all it is only a display for the public benefit, and is not meant to be seriously carried out.

An excellent instance of our habits in these respects is afforded by the attitude we have taken up with regard to the new drill and formations of our infantry. Before the new "Infantry Drill" made its appearance, rumor was rife as to the vast alterations and changes that would there be manifested. We were told on high authority that in future the soldier would only be taught what was really useful on the battle-field, and would not be expected to burden his memory with what he would discard the moment he took the field. Yet a battalion on parade still presents the same general appearance as heretofore, and the old formations and evolutions, very slightly modified, still vigorously survive.

It is laid down that certain increased intervals are to be allowed to men in the ranks, but practically one never sees a battalion except drawn up shoulder to shoulder, as of yore, and the space occupied by it in line differs

only very slightly indeed (owing to the change as regards the officers) from what it was before. The new rules are there for a battalion when formed for manœuvre, but how often are they observed, except perhaps at Aldershot? or how often are they considered in estimating the space that is occupied by it? Our more practical neighbors, the Germans, have likewise brought out new rules suited to the looser formations that must in the future prevail, but how differently are they applied! Advantage in war is the only goal *they* are striving for, and therefore everything which is not found to result in a practical efficiency is sacrificed. Discipline is rigid, because men must learn, above all else, to subordinate themselves to the will of their leader. A quick, smart bearing is inculcated, and much store set by a soldier-like appearance, because a man must have a certain self-respect ere he can be trusted to thoroughly perform his trust, and because they have by experience arrived at the conclusion that the smartest soldier on parade is likewise the most reliable in action. How much it has cost them to discard some of their cherished evolutions may be judged from the fact that drill and niceties of line and dressing have ever been a hobby in their Army. Frederick the Great's favorite manœuvre depended for its success on an amount of accuracy in moving in column across country and wheeling correctly into line at the critical moment, which it is not too much to say we have never even imagined. His father had trained the Army with equal care, and laid the foundation on which the son was able to build his success, and his descendants have piously preserved his tradition until the present day. *In no army was greater store set by precision of movement, and nowhere was the pedantry of the martinet more rife. Yet, how these very sticklers for uniformity have shown themselves sufficiently liberal to rightly read the spirit of the age, and have set an example to the rest of the world in their bold departure from received traditions! A German battalion is no longer drawn up in line on parade at all!*

It is formed in a line of company columns, and the "Zug," which roughly corresponds to one of our half-companies, being the third part of the strong German company, is now recognized as the real unit of battle. The officer in command of a battalion no longer endeavors to direct or interfere with the action of his companies; he acts towards them, on the contrary, somewhat as a brigadier does towards the battalions that form the component parts of his command. Before they become engaged, therefore, he explains his views, sets a task to each, and leaves the carrying out of the scheme in detail to the responsibility of the officers in charge. In like manner they more or less delegate their authority to the "Zug" leaders, and so in the heat of action it happens that the men seek guidance from an officer who is really near them or among them, and who can, on the spur of the moment, act on his own responsibility with decision and quickness.

The battalion, even in its own cantonments and on its own parade-ground, is always in the very formation it would find itself in at the moment of combat, and the men consequently learn to look to no one but their "Zug" leader, and he in his turn learns to accept responsibility, and decide according to his own judgment in a crisis. Every one is taught to

use his wits, and to take an intelligent part in the day's doings. That the same people whose iron discipline and rigid drill formation were the admiration of Europe since a century ago should be thus capable of divorcing themselves from an obsolete standard is much to their credit. Can we, who boast of our independence of thought and robust liberalism, say as much? or are we still fettered by red tape and afraid to venture more than half way over the causeway which leads from the old to the new?—*United Service Gazette*.

THE ENGLISH ARMY IN 1889.

The year 1889, though it has been distinguished by no prominent feats of war, will, we venture to think, form a year of considerable interest to the student of the future. There have, it is true, been no epoch-making victories—no Sadowas, no Gravelottes, no Sedans—nor have any operations whatever between civilized foes attracted the attention of the world. And yet for us Englishmen, at any rate, much of first-rate importance has taken place, if not in the field, at any rate in the administration and organization of our forces. Peace has its triumphs as well as war, and the changes introduced in peace-time frequently are more vital to the interests of the British soldier than those which are brought about in the course of actual fighting. Our little wars but little affect any but those who have the good fortune to be engaged in them; but changes in administration, in organization, in equipment and armament, leave their impress on all alike, and have the most far-reaching and important results. Innovations in these latter directions should therefore claim the especial attention of our soldiers, and of such the twelve months just elapsed have been unusually prolific. Of lesser deeds of arms we have likewise had, perhaps, more than the annual share; but, although these have not been wanting in brilliancy and *éclat*, they have been only of secondary importance, and it is therefore of the events which captivate popular imagination to a smaller degree, and yet are of far greater moment to the Army, that we propose to speak first.

The year gone by will perhaps chiefly be remembered by the new "Infantry Drill," which bears its date. The new attack formations and the new organizations of our brigades and divisions had been for a long time expected, and had even been anticipated by some officers ere the official work appeared. Almost simultaneously most of the great Powers realized that the vast progress made in arms of precision necessitated some corresponding advance in tactical formations, and France, England and Germany well-nigh at the same moment, issued new regulations for the handling of their men. Our more eager and thorough-going reformers demanded even larger concessions than we have adopted. The "Zeitgeist" of modern war is everywhere strongly setting towards decentralization and individual responsibility. The unit on the battle-field is no longer the battalion nor even the double company. Our weak companies may perhaps sufficiently well supply it at present, but the tendency is to seek it in even smaller handfuls of men, and the direction of fire is rapidly becoming the point to which other considerations must give way. We have not gone quite as far

as the Germans. We still draw up our battalions in rigid lines. The complete leap to the front has been too much for our insular prejudices and conservative notions, but we have put forward at any rate one foot, and we may expect that a few years more will see the entire advance accomplished. Nor have our artillery been behind their brethren of the line. They too, in common with foreign gunners, have formulated a new drill-book and fresh regulations for the direction of fire, and they too have got rid of much that was mere ceremony and parade, and frankly accepted what modern requirements demand. Yet we can only receive what has as yet been done as an earnest of something more to come, for much that is obsolete and of secondary value still fills the pages of what should be an entirely practical text-book.

The year just departed has likewise witnessed the birth, or rather regeneration, of the new Army Service Corps. If hitherto the Commissariat and Transport Departments of the Service have hardly succeeded in quite maintaining their position socially amongst the other officers of the Army, it has been mainly due to the fact that they have not been combatant officers.

The fighting line must ever claim precedence over the perhaps not less useful, but certainly less distinguished "departmental" corps, and amongst soldiers a distinction will inevitably be made between them. Now, however, this reproach has been removed from the Army Service Corps, and with the additional advantages they enjoy, and the chances of staff employment open to them, officers of the best social position will doubtless flock to their ranks, and a prestige and *esprit de corps* will, in course of time, grow up amongst them. Indeed, it is a question whether the interests of the officers of the Army in general have not been sacrificed to those lucky enough to belong to the new corps. Something like one-half of the appointments available on the General Staff of the Army has been allotted to them, and this at the expense of many who have worked hard and gained Staff College certificates to qualify them. The Staff of the Army will now only be open to three classes of officers—those qualified by active service, those who have obtained the Staff College certificate, and the Army Service Corps. The surest and easiest way to get on the Staff will be from the latter; and, if the Staff College is to attract officers, we think it will only be logical to make a certificate from the College a passport to the Army Service Corps, otherwise the Staff College will scarcely continue to obtain the best men, and will degenerate into a refuge for officers ordered to bad stations or those who are too lazy for regimental duty.

A startling innovation also recently occurred when a civilian was appointed to succeed Colonel Maitland as head of the Ordnance Factories. An outsider proverbially sees most of the game, but fails to appreciate niceties and requirements unless he has been trained thereto all his life, and knows from practical experience the points to look to. The cry for a civilian element in our ordnance manufacturing departments was, it is now admitted, the outcome of individual pique and disappointment, to use no stronger terms, and recent failures in the guns produced by private firms have amply vindicated the character of our soldier experts. The Royal gun factories have come with flying colors out of the searching investiga-

tions that have been made, and the presence of a civilian head is a concession to agitation, which we may have cause to regret, and which will certainly not tend to improve the methods in vogue at Woolwich.

1889 will likewise be remembered as the first year in which machine-guns, mounted infantry and cyclists made their appearance amongst the recognized forces of the Crown. We have here taken steps in advance of all other nations. Germany disbelieves in both machine-guns and mounted infantry, and France has not accepted the new arms either as an integral part of the organization of its armies. The needs of our colonial empire place us, however, in a different position to other nations, and in our continual small wars we have opportunities for deriving the full benefit from the new arms. We venture to think the rage for machine-gun fire has, however, well-nigh spent itself, and most officers are beginning to feel more confidence in the fire effect which can be produced by the magazine rifle. The introduction of this weapon will mark the close of 1889, and the small-bore rifle will prove one of the most important changes in armament that even this nineteenth century has witnessed. A bullet which has only the diameter of an ordinary cedar pencil would indeed appear absurd to the officers accustomed to the old "Brown Bess" or the Enfield. Yet the new projectile will suffice to render a man *hors de combat*, and will enable far more ammunition to be carried than heretofore. Indeed, the magazine system and the small-bore must go together, and it is the latter which has rendered the former possible. The difficulty caused by the stripping of the bullet has, we believe, at length been satisfactorily overcome, and we are assured that next drill season will find the troops at Aldershot handling the new rifle. Before we leave this subject we must also notice the valuable sights which have been invented by Major Lewes. They will, we feel convinced, materially assist the fire of our soldiers. In war the target is usually so wide that the chief difficulty is to get the men to give correct elevation; and Lewes' sights, by doing away with the difficulties of "fine" and "full" sights, materially simplify the task. We believe the same principle might with advantage be applied to the method of sighting our field guns too.

Another subject that has largely occupied public attention has been the inevitable introduction of a smokeless powder. Lord Wolseley assured us the other day that he believed in it, and that the coming spring would see it in practical use in our Service. Even if it do not make its *début* quite so early as that, we may confidently expect to see it in every-day use ere many months elapse. The times are ripe for it. Neither magazine rifles nor machine-guns can have fair scope until they are charged with it, and nowadays, when such a necessity arises, we may safely predict that the skill of the age will be equal to the occasion. Quick-firing guns for field artillery loom in the future, but we cannot hope to see them on the battle-field till the powder question is set at rest.

The year past will be remarkable, also, in that in it the first murmurs against the present high velocity field-guns began to make themselves openly heard. There is no concealing the fact that the 12-pounder shrapnel has not by any means realized the anticipations that were formed of it. It has

been proved, moreover, during the past twelve months, by the very best authority, namely, the Commandant of the School of Gunnery, that the high velocity of the 12-pounder is not only not necessary, but is positively detrimental to its effect with shrapnel. That it was intensely detrimental to the carriage and service of the gun, owing to the enormous recoil engendered, has been recognized all along, but it was a revelation to most people to learn that it tended to defeat the very object with which it was introduced. A slightly lower velocity would obviate many of the present difficulties encountered, and would improve the shooting of the piece.—*United Service Gazette*.

ELSWICK ARSENAL AND SHIP-YARD.

I.

QUICK-FIRING GUNS.

The application of the "quick-firing" principle to guns which may fairly be classed as armor-piercing, will probably do more to govern the tactics of naval commanders in any war which may arise in the immediate—if not the distant—future, than any other phase of production of warlike materiel. For service on shore it has been said that "by the aid of quick-firing guns and the position-finder we are enabled to carry out the ideal system of defense, viz., few guns in dispersed emplacements concealed by natural features. This system has long been advocated by Sir Andrew Clarke, and it is difficult to see how any further opposition can consistently be offered to it."* For the protection of mine fields the quick-firing gun would be invaluable; indeed, the authority we have just quoted considers the operations of sweeping, creeping, or countermining might be rendered absolutely impossible by the fire of quick-firing guns. "The only reliable defense against an assailant's inshore squadron," continues Captain Stone, "will be the extensive employment of quick-firing guns of sufficient calibre, not merely to annihilate landing or boarding parties, or to send a torpedo boat to the bottom, but equal to the task of putting a gunboat *hors de combat*, and either wrecking her or making it possible for the active harbor defense to capture her."

The use of shells charged with explosives more powerful than gunpowder has given additional importance to these projectiles of smaller natures, and with the increased development of higher explosives, a corresponding development of shell fire may be anticipated. This has already taken effect in the science of war-ship design, and naval constructors are now looking with less favor on large unarmored surfaces, and indeed the older battle-ships with comparatively thin armor, which a year or so ago were considered all but obsolete, are now considered as of some importance in view of the development of quick-firing guns and high explosive shells.

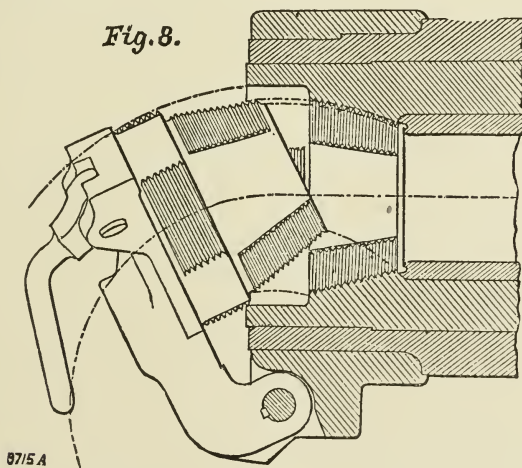
The part which the Elswick firm has taken in the introduction of quick-firing guns is well-known.

* Captain F. Gleadowe Stone, R. E. Lecture at the Royal United Service Institution, read 18th January, 1889.

This weapon is the 4.7 in. simultaneous loading breech-loading gun, calibre 4.724 in., or 12 cm., firing a shell of 45 lbs., with 12 lbs. of P. or S. powder. The gun is entirely of steel, its total length 16 ft. 2 in.; length of bore, 40 calibres; and weight, 41 cwt.

The breech is closed on the interrupted screw system, and to render the closing and opening more easy and rapid, the breech-block is formed in two steps, both of which have portions of an interrupted screw on their surfaces, the threads on one step standing longitudinally opposite to the blank spaces on the other. The breech-block swings rapidly into place, and is secured by a small turning movement. The gun is fired by electricity. In the base of the cartridge case is screwed an electric primer, against which presses an insulated steel pin, carried in the axis of the breech-block. This pin is in communication with the electric wires, which carry the current to fire the primer, only when the breech-block is closed, and secured by turning the lever downwards against the rear of the block. The circuit is closed, and

Fig. 8.



the charge fired by pulling the trigger of a pistol handle, arranged in a convenient position close to the sights. In case of the failure of the electrical firing gear each gun is also fitted with a percussion lock; the electric primer in the base of the cartridge is replaced by a percussion primer of the same form, and the steel pin, which in the former case supplied the electrical contact, now serves as a firing needle. The percussion firing gear also has a safety appliance to prevent the charge being fired till the breech is closed and locked. In this manner all danger of accidental discharge is avoided, and complete security gained. The gun is mounted in a rocking slide, in which it can only move in the direction of recoil. Fixed to this rocking slide is a combined spring and hydraulic buffer arrangement, which serves both to check the recoil and also to run the gun out again after discharge. An arm projects downwards from the breech of the gun and is attached by a nut to the ram of the hydraulic recoil press. The gun itself has no trunnions, but slides in the rocking slide, to the extent of the recoil, which is only 9 in.

The action on firing is as follows: The gun slides back, within the rock-

ing slide, the recoil being transmitted by the arm to the recoil press, where it is absorbed; the spring in the second cylinder is at the same time compressed. As soon as the recoil is absorbed the spring begins to act, and pushes the gun back, along the rocking slide to its first position. The lower part of the mounting is formed by a strong transverse steel plate or transom, which rigidly supports the mounting, and at the same time forms a substantial protection or shield to the base of the structure and the men working behind it. Above this is a lighter steel shield, covering the detachment from rifle fire, the upper portion being arranged to hinge back, so as to admit of a more extended view when using the gun at night. The under carriage is carried on live rollers running on a bed-plate, so as to insure great freedom of training, which is effected either by means of a shoulder-piece rigidly connected to the under carriage, or by a worm-wheel training gear, worked by a hand-wheel at the sighting or firing position. A clamp on the bed plate is provided, so as to fix the gun at any desired point of training. The elevation and depression of the gun require very little power, as the gun and working slide are accurately balanced on their trunnion bearings. The rack and pinion gear for this purpose is worked by an elevating hand-wheel close to the training wheel, and thus also at the sighting or firing position.

This description applies equally to the quick-firing guns and mountings of the larger natures. On account, however, of the increased weight of the ammunition, the cartridge and projectile are often handled separately.

The quick-firing gun is an extension, or at any rate the outcome, of the smaller machine guns of the Hotchkiss, Nordenfeldt, and Gardner type. The Hotchkiss are, however, now made up to 3.94 in. bore, and throw a projectile of 33 lbs. This class of gun is useful against torpedo boats and unarmored structures, but could hardly be used with effect upon any protection which could be dignified with the name of armor. It will be seen that the quick-firing guns would play a very important part in encounters between battle-ships, for those of the most modern types of design have important positions open to the attacks of these guns, even those not of the heaviest calibre.

The ideal gun has been described as that which possesses high penetrative power, and a capacity for firing shells with the most effective bursting charges, whilst it could, when required, be fired with great rapidity to repel a flotilla of attacking vessels. A glance at the tables will show that these points are secured with the weapons we are now considering. With the 4.7-in., 5.5-in., and 6-in. guns the projectiles are 45 lbs., 70 lbs., and 100 lbs., or even 120 lbs. The rate of fire has been found in actual practice to be from six rounds per minute with the 6-in. gun to fourteen rounds per minute with the 4.7-in. gun. If we compare the rate of fire of these guns with that obtained from the ordinary breech-loading guns in the Service we find that some experiments carried out on shipboard by the Admiralty gave ten rounds in the 47 seconds from 4.7-in. quick-firing gun, whilst the 5-in. ordinary breechloader took 5 minutes 7 seconds to discharge the same number of rounds.

It is unnecessary to dwell on the advantages of rapidity of fire in action.

It was this very feature which contributed so much in times past to British naval victories; although then the result was achieved by the superior hardihood and address of our seamen, who could serve their guns so much quicker than could their enemies. In this epoch of mechanism, however, we must depend on the brains of our inventors, rather than the muscles and nerves of our seamen, to give like results; although we by no means wish to say that the day for nerve and muscle is past. Indeed the value of cool and disciplined courage was never more apparent in the past than it will be in the next great naval war. Hardly any superiority in personnel could compensate for the disadvantage in materiel of a gun requiring over five minutes to do what another would accomplish in 47 seconds, and it is obvious therefore that we must have quick-firing guns in spite of minor objections that may be raised against them, such as difficulties on account of smoke—when smokeless powder is not used—or in getting the ammunition to the gun with sufficient rapidity. The Admiralty have not been slow to acknowledge the advantages of the new principle, and large orders for the navy for 4.7-in. and 6-in. guns have been given to the Messrs. Armstrong, the results of which are very plainly visible just now in the Elswick shops.

We have already described the mechanism of this gun, but there are some points in the design put forward by the makers to which attention may be called. By the interrupted screw system of breech-closing two advantages are secured. Firstly, the action of opening and closing the breech is much simplified, as the breech-piece need not be withdrawn before hinging away; and secondly, the coned shape of the breech-screw enables it to take hold, not only of the inner surface of the metal of the breech-piece or jacket, but also distributes the engagement, and therefore the strain and support, throughout a considerable thickness of the gun. The breech-screw is further arranged so that the threads of the smaller end of the cone correspond longitudinally with the interrupted spaces of the larger end, and *vice versa*, so that the strain and support are also distributed throughout the entire circumference of the breech-screw, instead of, as formerly, half the circumference being lost by the interrupted spaces. In the mounting the labor of training and elevating is reduced to a minimum. A shoulder clutch and a pistol trigger are provided, and the piece can be handled by a single man with the same ease as the small Hotchkiss 6-pounder. The recoil is so arranged that the man aiming can alter the position of the gun up to the very instant of firing, and also keep control of the gun working and sighting gear during the actual discharge, or throughout any number of rounds. Naval officers will not be slow to appreciate the advantage secured by this arrangement under the varying conditions of actions at sea.

The carriage allows the gun to recoil always in the line of fire, and the fixings and deck are thus to a large extent relieved of the ordinary recoil strains. After discharge the gun returns instantly and automatically to firing position. A substantial shield of steel, $4\frac{1}{4}$ in. thick, is provided in front, and protection is thus given to the men serving the gun.

In the ammunition the principle of the ordinary rifle cartridge has been

extended to these guns; the projectile and powder charge forming only one piece. The powder is put into a solid-drawn brass cartridge, in the mouth of which the projectile is fixed, so that the whole can be handled together. A great saving of time and labor is thus effected, and the incidental advantages of increased safety, and the immunity of the powder from climatic deterioration are also secured. To the fact of the projectile and charge being thus placed in the gun at the same time is due the title of "simultaneous loading" which has been applied to these guns. To the improvement in the ammunition the quick rate of firing is very largely to be attributed. The solid-drawn cartridge cases, owing to their great size, have presented difficulties in manufacture, but these have been now surmounted, and it is found in practice that they can be fired as many as ten times over without need of reforming.

In apportioning the ammunition for these guns, penetrating shell will constitute a very large proportion of the whole equipment.

Side by side with the improvement in the guns and mountings have gone new discoveries and developments of powder. The Chilworth Powder Company are now manufacturing a powder specially designed for use in these guns. It is practically smokeless—an inestimable advantage where rapid firing is an essential, and the hanging smoke which makes good aiming impossible is thus almost entirely avoided. The charge of this Chilworth powder is very much less than that of black prismatic required to produce the same effects. The pressures obtained with it are very uniform, and the velocities very high, ranging up to 2,450 ft. or 2,500 ft. per second.

The following table—table V.—gives the average results obtained with these guns. Some of the data have already been given, but it will be found convenient for reference to put it in this form :

TABLE V.

Nature and Weight of Gun.	Rounds per minute.	Weight and Nature of Charge.	Weight of Projectile in Pounds.	Maximum Pressure in Chamber in Tons.	Muzzle Velocity in Feet per Second.	Total Energy in Foot-Tons.	Penetration of Wrought-Iron Plate in inches.
		lb.					
4.724-in. (41 cwt.).....	12	12 P.	45	15.0	1850	1068	8.5
	12	12 S.	45	15.5	2250	1580	10.7
5.5-in. (58 cwt.).....	9	34 B. P.	70	14.0	2100	2141	11.6
	9	25 S.	70	15.0	2215	2381	12.2
6-in. (110 cwt.).....	6	60 B. P.	100	15.0	2260	3542	14.2
	6	38 S.	100	16.5	3340	3797	14.7

P.=Pebble.

S.=Smokeless.

B.P.=Brown prismatic.

These results are sufficiently remarkable; but it is claimed that if they are translated into the conditions of actual warfare, they become still more striking. One of the principal reasons that led to so large an employment of quick-firing guns in naval services was no doubt the necessity of being able to cope instantly and effectually with the attack of torpedo boats.

The very high rate of speed possessed by the modern torpedo boat, whilst increasing its powers of offense, has at the same time diminished the risk of its being hit. It not only remains a much shorter time exposed to fire when making its attack, but its rapid motion necessitates a great alteration of aim between each round fired at it, and a corresponding likelihood of error. Suppose a torpedo-boat to be sighted at a distance of 1,500 yards by a war vessel having a broadside armament of three Service 5-in. breech-loading guns, each capable of firing two rounds a minute. It is estimated that the torpedo-boat could not hope to discharge a torpedo with much certainty at a longer range than 200 yards; and would, therefore, have to traverse a distance of 1,300 yards under fire before she could begin the attack. Assuming the speed of a first-class torpedo-boat to be twenty knots an hour, which is certainly a high figure, the time occupied in traversing 1,300 yards would be, roughly speaking, two minutes. The war vessel, therefore, armed with a broadside of three 5-in. guns, each firing two rounds per minute, would be able to discharge twelve shots at the torpedo-boat before there was a chance of her being torpedoed. If, however, in lieu of the three Service 5-in. guns, she was armed with three of the improved Armstrong 4.7-in. 45-pounders, she could in the same time fire no less than seventy-two shots, each gun being capable of firing twelve shots a minute.

Besides the advantage of being able to fire six times as often, there is the collateral one of a very slight alteration of aim being required in one case and a very considerable one in the other. Between each round of the 5-in. breech-loading gun, the torpedo-boat would move 340 yards, and the aim would have to be correspondingly altered; while between the rounds of the 45-pounder gun, she would only move thirty yards, and a very slight alteration would be required, and a successful shot could thus be instantly repeated.

But although it was the torpedo-boat which first gave such an impetus to the introduction of the quick-firing gun, the weapon has been so largely developed in the progress of time that it now holds a much higher position and cannot fail to play an important part in encounters between important war vessels in the future.

Comment and Criticism.

I.

“Mountain Artillery.”

Major Joseph P. Sanger, Inspector General, U. S. A.

DURING the sessions of the Artillery Council, 1887, this subject was very carefully considered and commended to the notice and action of the President. In April, 1889, per G. O. 38, Headquarters of the Army, Battery C, 1st Artillery, was designated as a mountain battery. For reasons which have not been made public, but which, no doubt, fully justified the action taken, this battery was dismounted in September following, and mountain artillery, as a branch of our artillery service, disappeared from view. With the hope and expectation that it will soon reappear to complete the various branches of this important arm, I submit the following reflections, although no longer connected with the artillery service.

In the last number of the JOURNAL Lieutenant Parkhurst, of the 4th Artillery, has called attention to this subject, and given some information respecting the object and character of mountain artillery. Let us hope that his efforts to revive interest in a topic of so much importance to the artillery may not be in vain, but that during the present *eclipse*, artillery officers may, by careful consideration, be prepared to give intelligent direction to the new luminary whenever it shall reappear above the military horizon. In common with a very large majority of our artillery officers I have never served with mountain artillery; nevertheless I have been for many years an interested student of the subject, and with the exception of the Spanish batteries, have had the good fortune to see mountain batteries of all foreign armies in which it is a distinct branch of the artillery service.

Whatever the experience of other countries may have been, it cannot be denied that mountain artillery is of considerable importance to us. At no time during the past twenty-five years could we have dispensed with it, had it been an existent branch of the arm, and while the probabilities of its frequent use are diminishing with the decreased activity of our warlike Indians, there will no doubt be occasions in future when its presence will be needed to co-operate with the other arms in adjusting difficulties and preserving the peace. Mountain artillery has no double rôle to enact, and every attempt to make it as useful on the plains as in the mountains has resulted unfavorably. Its only mission is mountain warfare, and when this fact has been kept pointedly in view, it has fully satisfied all expectations as to its capacity and value. In this country artillery troops, in recent years, save those stationed along the Pacific Coast, have practically been excluded from all participation in the military operations of the West. This has not, however, prevented the employment of guns upon various occasions, and this has led to the belief that the weapons of the arm can be handled as readily by either the infantry or cavalry as by the artillery, and that the latter have no professional field outside of a sea-coast fortification or the field batteries annexed thereto. Upon just what theory the military authorities have proceeded to shut out the artillery, and turn their field duties over to any one willing to perform them, it is difficult to say, but that such administration has injured the artillery and has not en-

hanced the conduct of military operations, every impartial judge will admit. "Every man to his trade," is a truism as applicable to professional men as to those of other vocations, and but little reliance can be placed on services rendered hap-hazard in one branch by those whose experience has been gained in another. The idea that soldiers can pass indifferently from one arm to another and render efficient service on the battle-field has long since been rejected as fallacious, and mere ability to ornament a parade ground or perform some prescribed drill manœuvre is not now received as indicating the ability to *direct* troops skillfully when brought into contact with the enemy. Hence, while I do not mean to disparage in any way such services as may have been rendered by makeshift batteries in the hands of any one picked up for the occasion during the past twenty-five years, I am satisfied that the batteries and the services they performed would have been of very great value had they been rendered by the artillery, whose skill, interest and professional spirit and reputation would have been aroused and involved in the result. I do not believe that any officer can command with equal skill all arms of the Service unless he has been trained by experience to do so. Every one knows how long after he has been transferred to the mounted service the habits and peculiarities of a foot soldier will cling to him and, *vice versa*, and how these frequently become a serious drawback to him and to those associated with him. This is the common experience and has resulted in some armies in a requirement that all divisional generals, or those who command the three arms united, shall serve in each long enough to have acquired the necessary experience. Hence, I say, if there be any probability that artillery can ever again serve a useful purpose in this country by taking part in military operations conducted on the plains or in a mountainous region, such services should be rendered by the artillery personnel, equipped and instructed according to the best experience of the arm.

My first view of mountain artillery was in India, in the winter of 1876, where I had an opportunity of witnessing the drill and noting the equipment of some of the batteries of the Punjab stationed along the north-western frontier. My next experience in the following spring was with the Russian mountain batteries serving in the Army of the Caucasus, and these I saw again at the Russian camp of manœuvre near St. Petersburg in the month of August following, where they were on exhibition as batteries, models after which all other mountain batteries were to pattern. Their training was excellent, the guns being unpacked, placed in battery and fired in 48 seconds. Previous to this I had seen one of the mountain batteries of Italy, and subsequently the material of the Austrian batteries. Germany and France do not maintain mountain artillery on the continent as a distinct branch, and the mountain batteries of minor States are imitations of their more powerful neighbors. As a result of my observation and study, I am convinced, as far as one ought to be who has had no practical experience, that no attempt should be made to equip mountain batteries for any other purpose than service in a rough hilly country, and that their outfit is primarily for that kind of service, and nothing else. The idea that such batteries may be called on for service on the plains, should not be permitted to modify to any extent their proper equipment. I assume this as a fundamental principle by which I think the correctness of all theories of organization, equipment and instruction should be tested.

Not so, however, those who have adopted the general utility view, and who think the equipment of the batteries should be equal to all emergencies. This difference of opinion has caused a corresponding difference in the armament and equipment of mountain artillery, and in my opinion retarded its steady development.

THE GUN.—We have no mountain gun at all comparable with those of foreign armories or which would produce much effect in mountain warfare. The Hotchkiss mountain gun and the 12 pdr. mountain howitzer are neither of them worth a rush for

the kind of service required ; the first because of its small calibre, and the second from lack of power ; but if I had to choose between them I should select the mountain howitzer or what would answer better in some respects the 24 pdr. Coehorn mortar. I may be permitted to remark in this connection that in its day our mountain artillery equipment was second to that of no other country, and except as to the materials of which it is made may be taken even now as an appropriate point of departure in devising a new system. The English jointed gun is the direct offspring of the utility theory, to which reference has been made, the object in this case being to produce a gun which will be effective not only in a mountainous, but in an open or level country. It is jointed because it is necessary to distribute its weight (400 lbs). In a mountain gun it has very high power as well as great weight, and in both respects is much beyond necessary or even desirable limits.

I think the best experience has shown that in mountain warfare, one mile may be taken as the average extreme fighting range. This results from the nature of the country, and the fact that the cover is usually such as to warrant a much closer approach ; consequently a high power gun is not needed. Neither is a gun of complex mechanism, and especially one which like the jointed gun, may be placed *hors de combat* by a serious accident to either of the animals carrying the parts.

The needed attributes are simplicity of mechanism, a weight not to exceed 215 lbs., a length not to exceed 15 calibres, and power enough to render a shrapnel destructive at a distance of one mile.

As moral effect is of great consequence, the tendency is towards larger calibres by means of which projectiles of not less than 12 lbs. weight may be used.

THE CARRIAGE.—Opinion is divided in respect to the character of the carriage ; whether or not it should have wheels is the question. Those who advocate discarding the wheels wish to rid the outfit entirely of everything which will reduce the weight, and confine the use of the battery to mountain warfare. I am in sympathy to some extent with this view, and would be entirely so were it not that I think any expedient by which the labor of the animals can be made available at all times is valuable, and this is the principal function of the wheels. In a very difficult country during inclement weather the animals are liable to chafes and to ugly sores which, for the time being, render them unserviceable as pack animals. By putting them in shafts their injuries can be treated without difficulty and speedy cures effected. Wheels have no other property that occurs to me worth mentioning, and I am not sure that even for this purpose they should be retained when we consider how much the outfit would be simplified by running them. The carriage should be of steel with some one of the numerous devices for taking up the strain of recoil, and should be provided with apparatus for giving an elevation of 35°. For this purpose the device used by the English would answer as well as any other. The carriage should permit a depression of 20°. There should be no limber even if the carriage be mounted on wheels, as the shafts can be readily attached to the trail. The length of the axle should not exceed 30 inches, or the weight of the carriage without wheels 200 lbs.

PACK SADDLES.—The frames should be of steel and adapted to the various objects, which will be understood by a glance at any drawing of mountain artillery to which the reader may have access. The weight should not exceed 50 lbs. The points to be observed are stability of the load, which should not exceed 275 lbs. per animal, the removal of all pressure from the backbone, and an entire absence of cinching or tight girthing.

The saddles should be so thoroughly padded as to render the use of blankets or other pads unnecessary, and should be provided with breast-band and crupper to prevent shifting.

Packers who are in the habit of securing their saddles by the use of cinch-straps will not approve of either the crupper or breast strap, preferring to rely on their ability to secure the saddle by squeezing the chest and belly of the animal until it squeals and is hardly able to breathe; but the unprejudiced officer will try them in order to do away if possible with this barbarous custom, if for no other reason.

ANIMALS.—If the carriages have wheels, four animals per gun will be needed, to-wit: one for the piece, one for the carriage, one for the wheels, and one for the two ammunition boxes, which should accompany the piece. The officers and chiefs of pieces should be mounted, and such other members of the battery as deserve to be, as, for example, the 1st sergeant, quartermaster sergeant, stable sergeant, farriers, saddlers and trumpeters. The number of animals will therefore depend on the number of pieces in the battery and who it may be decided to mount.

Whether they should be horses or mules is a question. The Russians use horses, while the English and others use mules; both have been used in this country, though how they compared, I have not the means of knowing. One of the objections to horses is their height as relates to their weight. For ease in manœuvring no animal should be above 14 hands, and if they are strong and well built they need not exceed 13½. One of the experiments which might well be tried in this country is a comparison of the respective merits of horses and pack-mules for mountain artillery service, which it should be remembered differs in several important particulars from the service of a pack-train.

UNIFORMS.—No better dress for mountain work can be found than the tunic, knickerbockers, leggings and shoes. Each soldier should carry a revolver and be instructed in its use; no other side-arms are necessary.

INSTRUCTION.—One of the first objects to engage the attention of our artillery officers will be a suitable manual of instruction, embracing the drill, the details of the equipments and such suggestions concerning mountain warfare as may be useful. Such manœuvres as I have seen have been very simple, the principal object being to practice the men in packing and unpacking, in selecting good positions and in climbing and marching over rough mountainous ground. These exercises should not take place on the level, and this suggests the appropriate stations of the mountain batteries. I do not concur with Lieutenant Parkhurst in regard to Fort Riley; the ground about that post, while undulating, is by no means suitable for such purposes. West Point on the Hudson, is a far better post for the commencement of operations. As soon as they are equipped the batteries should be transferred to Arizona, New Mexico, or to any other region which promises employment and is adapted to their proper training. This, if properly conducted will soon open to the artillery a field which has been closed against them for many years: one they should hasten to re-occupy in the confident belief that by so doing they will greatly promote the influence and usefulness of the arm.

II.

“New Powders and Guns.”

Major George W. McKee, Ordnance Dept., U. S. A.

IN the article by Mr. J. A. Longridge (*Engineering, London*), reprinted in the JOURNAL OF THE MILITARY SERVICE INSTITUTION, January, 1890, and anent which a note was sent me by the Editor of the latter publication, I had hoped to find a discussion by such an able authority on the subject of smokeless powders in general; but he confines his remarks to the Chilworth powder, in comparison with two others, and devotes most of his article to wire as the proper material to be used in the construction of guns.

As regards the portion of his article, referring to the Navy, I feel great diffidence in making any remarks whatever, as I am ignorant of many things appertaining to the nautical profession. I would, however, think that Admiral Mayne was right in his "deprecation of monster guns afloat." It would occur to me, as a landsman, that a very fleet vessel—one that could fight, or run away, as the occasion required, and carrying some long-range, rapid-firing guns of moderate calibre—would be the kind of man-of-war capable of inflicting great damage anywhere. Such guns could be used with the powders we are now familiar with until we perfect a high-explosive for shells, and then the necessity for heavy guns, on sea or land, will be obviated. As to the ultimate success of this high explosive for shells it is believed there is no doubt whatever. It is simply a question of time and trial, and it is thought the time will be brief. We will, with a comparatively small-calibre gun, be able to safely deliver an enormous energy at the objective point.

It is understood that I refer to high explosives in shells that are propelled from guns capable of giving them *range* and *energy*. The so-called Zalinski Pneumatic Dynamite Gun can give neither the one nor the other, and is, in my opinion, one of the greatest military humbugs of the age. Any enterprising captain of a man-of-war, even if he be equipped only with Hotchkiss' revolving cannon, will have a very easy job on his hands should he happen upon a vessel armed with these pneumatic devices. And what possible chance would such a vessel stand with another like the *Piemonte* (to quote Mr. Longridge), "pouring out a storm of twenty-four projectiles of 100 lbs. each, and thirty-six projectiles of 45 lbs. each, or sixty projectiles per minute, any one of which, by a fair hit would put one of the large guns out of action"?

And those pneumatic guns mounted on land, having no range, and, from their great length, not being able to be protected, will, when attacked by modern guns, be destroyed with ease without inflicting the slightest injury upon any enemy of intelligence.

Coming now to Mr. Longridge's calculations and summary of results as regards the powders, the case may be briefly stated as follows: The 6-inch quick-firing gun, with a charge of 38 lbs. of Chilworth powder and a projectile of 100 lbs., gives a muzzle velocity of 2300 feet per second, while the Service 6-inch gun, with the same projectile, and a charge of 55 lbs. of brown powder gives only 1970 feet per second. The lengths, in calibres, of these guns are respectively:

6-inch Quick-firing.....	40
6-inch Service.....	26

Here it is seen that 38 lbs. of Chilworth powder, with the opportunity of sustaining a pressure through an additional seven feet of bore, will give a greater energy than 55 lbs. of brown powder in the Service gun—the calibres and projectiles being the same. But, with an equal length of bore, the 55 lbs. of brown powder in the Service gun give a calculated muzzle velocity of 2340 feet—exceeding the 38 lbs. of Chilworth by only 40 feet. Hence it appears that the Chilworth is much stronger than the brown, but what its pressures were we are not permitted to know—Lord Armstrong speaking of them only as "very permissible pressures." Mr. Longridge presumes that the pressure was about 15 to 17 tons per square inch, and states that the pressure of 38 lbs. of pebble powder would be about 28 tons per square inch.

Mr. Longridge says that 38 lbs. of pebble powder, in a 6-inch gun of 40 calibres in length, would give a muzzle velocity of at least 2600 feet per second. As nothing is said to the contrary, he means, of course, the same 6-inch Service gun extended to 40 calibres but with the original diameters through base line and reinforce. He states the converse of the proposition as follows: "What would be the length of a 6-inch gun to give the same velocity with 38 lbs. of pebble as would be given by the new

quick-firing 6-inch gun with the same charge of Chilworth powder?" The reply to this is $22\frac{1}{2}$ calibres. Consequently the respective lengths of the guns would be ;

	ft.
New gun with Chilworth powder.....	20
Ordnance gun with pebble.....	$11\frac{1}{4}$

This is all very well, provided the gun, as at present constructed, will be able to live a reasonable number of rounds while sustaining a pressure of 28 tons per square inch. I observe that the Ordnance Committee deems it wise to use a comparatively mild powder as, although the Chilworth is much stronger than the brown, it certainly, if Mr. Longridge's presumption about the "permissible pressures" is correct, is much milder than the pebble powder.

As Mr. Longridge justly remarks in this immediate connection: "What is a 'permissible pressure' depends solely on the strength of the gun." And he states: "It is perfectly certain that by the adoption of wire a gun may be made which will be less strained by an internal pressure of 28 tons than a forged steel gun of the same calibre with a pressure of 17 tons."

This is a consummation wished by everybody and will be welcomed everywhere where it is satisfactorily shown, by thorough tests, that the wire will do what Mr. Longridge claims for it. I was present at Frankford Arsenal when the Woodbridge 10-inch wire gun at the tenth round developed a crack, or opening of the wire, on the exterior just above the seat of the charge. I have always thought that this initial rupture, or separation, was due to what, for want of a better term, might be called Tangential Vibration, resulting from the great Tangential or Circumferential strain. It occurred just where the tangential strain would be at its maximum and was not, in my opinion, due to the longitudinal strain, as is generally supposed. I cannot enter into any details of this discussion at present, and I will therefore condense what I have to say into as few words as possible.

The superincumbent wire about the excellent tube in that 10-inch Woodbridge gun certainly ought, whether the brazing were defective or not, as I understand is alleged by Dr. Woodbridge, to have afforded enough support to the tube to have enabled it to overcome the longitudinal strains to which it was subjected. These strains can readily be calculated from the record, not one of the pressures, up to, and including, the tenth round, exceeding 19 English tons.

If a section or log—say of a gum-tree for instance—with a tough, knotty fibre, growing spirally around the heart of the tree, as is often seen, be bored out through the heart so as to form a hollow cylinder, and the interior filled with wax or subjected to pressure from a piston, we will have a good illustration of a tangential strain on a wire gun. The tangential effort to split the log from end to end will follow the lines of least resistance, and it will be seen that where the tough, knotty fibre runs around or envelopes the wooden cylinder, the fracture will follow the inclination of the knot. Thus, if the inclination, at some point, be between 45° and the perpendicular to the axis, a rupture or opening will take place along that line, and the tendency of the effort will be to separate the long cylinder into two smaller ones instead of splitting it from one end to the other. Any one observing this phenomenon of rupture, and not being acquainted with the physical constitution of the log before the fact, would very naturally conclude that it had been separated into two cylinders, somewhere in the midst, by a force pulling it from end to end—in other words by a longitudinal strain.

A factitious case of a powerful knotty fibre around an axis occurs exactly where wire is wound around a tube. In this latter instance we have *all* knotty fibre, or wire, to sustain the tube and aid in the work of resisting the various strains. And in a wire gun constructed like the Woodbridge 10-inch (for that is the gun we are considering) the

initial rupture, or opening, will commence, I believe, along a line of exterior section, perpendicular or inclined to the axis, which is located on the circumference of least resistance to the tangential strain, and its vibration.

Although the powder (Dupont's Hexagonal) was not so strong as the English Pebble, nevertheless it would appear that it was sufficiently *brisant* to prevent the propagation of molecular disturbance to the outer layers of wire in time to support the inner layers and tube. These latter were doing all the work and the outer layers were simply subjected to a tremendous vibration, resulting mainly from the tangential strain, which very soon caused a separation, or opening, of the wire at the very place where it was to be expected. This opening progressed, of course, at subsequent rounds, and when it approached the tube, it gave the comparatively weak longitudinal strain an opportunity to assist in breaking the gun.

But, in this particular instance, the brazing of the wire may have tended to alter its physical properties, and to abnormally increase the density and diminish the elasticity of the system—all of which effects would have militated against the strength of the gun. The wire must be so disposed as to attain the rigidity and homogeneity necessary for the passage of the wave front to the surface in time to enable the whole system to work simultaneously. Such a disposition, it is believed, did not obtain in the late Woodbridge 10-inch gun.

The mechanical difficulty attending the enveloping of a tube with wire so as to afford a rigid and homogeneous body capable of quickly propagating molecular disturbance, must not therefore be lost sight of in this method of construction. The greater the radius the greater will be the chances for faulty construction, and the percentage of successful small-calibre wire guns, it is thought, will be much greater than that of similar guns of large calibre.

In all of the above it is understood that I am in no way prepossessed against wire, and trust that Mr. Longridge, Dr. Woodbridge, or some other scientist, may perfect it in its application to gun construction. I simply state empirical facts that have come under my observation, and from them present my deductions, which may be erroneous.

Captain James M. Ingalls, 1st Artillery, U. S. A.

Mr. Longridge sums up by saying: "I am satisfied that a 12-inch gun about 25 feet long and weighing about 50 to 60 tons, and mounted on a disappearing carriage, is the heaviest gun that ought to be put on board a battle-ship. Such a gun, fired with a powder of about one cubic inch grain, would give to a 1500 lbs. projectile a velocity of 1830 f. s. at 1000 yards from the muzzle, and this would have the same energy per inch of circumference, and consequently the same power of penetration as the 1800 lbs. projectile fired from the 110-ton guns of the *Victoria*."

The gun thus described would be among the most powerful armor-piercing guns yet manufactured, ranking in this respect with the 40-cm. gun furnished the Italian Government by Krupp, for the defense of Spezzia. It would not only have *greater* power of penetration than the 110-ton at 1000 yards, but at 10,000 yards as well, or, indeed, at any practicable range whatever. Its muzzle velocity would be 1915 f. s.; and, for any angle of elevation in direct fire, its trajectory would be flatter (and therefore its range greater) than that of any gun in existence. Such a gun would naturally displace all other kinds of heavy guns for battle-ships, could it be procured.

It is possible that a wire-wound gun of the future may be able, with a 25-calibre bore, to give to a projectile *5 calibres in length*, a muzzle velocity of 1915 f. s. with safety to the gun. Of this no one is perhaps better able to judge than Mr. Longridge himself, who has made this kind of gun a special study.

The writer states that it is practically useless to fire against armor at a greater distance than 1500 yards. He makes this statement without reservation ; but he can hardly mean to apply it to the fire of heavy guns from shore batteries against armored ships. There are guns now mounted which can penetrate almost any armor afloat at two or three times that distance, with at least an even chance of hitting. Take, for example, the guns at Spezzia, mentioned above. The weight of projectile is 2028 lbs., and velocity at 4375 yards from the muzzle, 1470 f. s., giving an energy of 30,400 foot-tons, or 615 foot-tons per inch of shot's circumference, an energy which would penetrate 25 inches of wrought-iron armor. The angle of elevation for this range is $3^{\circ} 54'$.

Now, as regards the probability of hitting, which is almost as important as the power to penetrate. The probable rectangle for these guns at a range of 4375 yards is, for a vertical target, 7.1 feet in height and 4.2 feet in breadth ; and for a horizontal target, 82 feet in length. These rectangles were determined by firing on the proving ground, and their dimensions should be doubled to make them conform to the conditions of actual warfare. This is the rule generally adopted, and is considered a safe one. It will thus be seen that there is at least an even chance of hitting a battle-ship at 4375 yards, the range being supposed known. Of course there should be no guess-work in actual warfare in determining the distance of an enemy's ship from a permanent fortification. Means should be, and will be, at hand to ascertain the enemy's position with all desired accuracy.

While upon this subject it may be interesting to remark that 8 shots were fired from these guns on the proving ground with an angle of elevation of 18° , which gave a mean range of 13,146 yards or 7.46 miles. The dimensions of the probable rectangle (horizontal) deduced from these shots were 164.5 feet by 36.1 feet. Doubling these we see that there is a fair chance of hitting the deck of a ship coming bow on, with these guns, at a distance of nearly $7\frac{1}{2}$ miles. The striking velocity would be 1185 f. s., angle of fall 35° , and energy 19,754 foot-tons—enough even with a glancing blow to demolish the deck of any ship.

III.

“Military Instruction of Our Youth and Citizen Soldiers.” *

Colonel Thos. M. Anderson, 14th Infantry, U. S. A.

AS the Swedish and Swiss armies are militia organizations, it seemed well to consider, in connection with the subject of the lecture, their methods of training their so-called citizen soldiers. In Sweden and Norway the Army is kept up by a rotating militia conscription, with an annual training of from thirty to forty-two days for each contingent.

The active contingent of the Swiss Militia is 3 per cent. of the total population, maintained at a cost of \$25 per year. This body has a preliminary training of four weeks, and of eight days a year during each term. This is for infantry; the other branches have six weeks. All officers have six weeks' instruction besides taking their turns in the drilling of troops.

But the notable point is, that in both Sweden and Switzerland all boys at school are trained in military exercises. In 1882 there were 272,000 boys in the Swiss schools, a very respectable contingent. In this it is suggested there is an example for us. If we can have training in our schools we need not trouble ourselves about the shortcomings of State guards.

Nor is it certain that our militia care much for our help. I know three regular

* See article by Lieutenant Eastman, this JOURNAL (*ante*).

inspectors of the State Guards who have stated that most of the men they have inspected seemed indifferent to their suggestions, and that some of the colonels had shown by their manner that they thought they knew more than their inspectors.

Nevertheless, I think, on the whole, that there is a sentiment of mutual respect subsisting between our Service and the Guardsmen which it is our duty to cultivate.

Captain W. E. Birkhimer, A. J. A.

While undoubtedly military training in schools would prove beneficial, if wisely practised, yet the great duty of the Regular Army must be to prove itself worth the money expended on it, as a regular army, pure and simple, and not as an instructor of the youth of the land. Primarily the Regular Army should strive to arrive as a regular army at a high state of efficiency and keep it, and secondarily, only, as a coacher of National Guards.

I have been a witness to a state of affairs in the matter of the ardor of "citizen soldiers," as the lecturer called them, which excited my admiration and at the same time is food for serious thought. It always pleased me to see the military profession honored and military spirit evinced anywhere under any circumstances. But to see that spirit misdirected is not pleasant. This I have witnessed in the Southern States when I was last stationed there, in the competitive drills which were holden at various times in some of the cities, and where I often acted as judge. These companies were as a rule composed of the best young men in the South. They were martial in their instincts, soldiers by nature. They carried the points of company drill for infantry and gun-drill for artillery, far beyond all practical requirements in accuracy of execution. They ran to the showy features, which would please the eye, but apparently thought nothing of other more important matters not calculated to arrest the attention of the multitude assembled to witness the drills. They knew and cared little for camp duties. Their pieces were not kept in good condition. Skirmish drill was scarcely known and its value not appreciated. All the military parade was for mere show. The friends, mothers, sisters of the contestants were there to rejoice with the winners, or join in the maledictions of the losers. Large sums of money were put up as prizes. Now, all this was in one sense pleasing, but in another point of view it was a really saddening sight. It was pleasant to see this display of military spirit, but it was saddening to see it wasted, or having an unhealthy growth. Now the point I want to make is that, if this military spirit can be directed in proper channels, it ought to be possible to utilize it practically for the benefit of the communities in which these military organizations reside, and also for the benefit of the general government. Take the artillery companies of New Orleans for instance. The old Washington Artillery had a history that any battery or regiment might be proud of. And, speaking as an artilleryman I would say that I have never seen any body of troops of that arm with whom in war I would rather take the field than the Washington Artillery. They lived and thrived on their military spirit, and the sacrifices of time, comfort and means these men would make to keep up their organization and perfectness of drill was pleasing and astonishing. I would like to see some method adopted by which these volunteer organizations, call them citizen soldiers or what you will, would be recognized and made to understand that their efforts and real worth are appreciated. But the matter is one that requires delicate handling, and spasmodic efforts will little avail; nothing will be of permanent use unless it be a maturely digested plan carried out under the auspices of the General Government in aid of the States.

Lieut. Edward J. McClernand, 2d Cavalry, U. S. A.

It will be a great step in advance if we can induce the States to introduce a military training in their public schools. The discipline and setting up, little as it might

be, would be useful in either military or civil life. The youth of the land takes naturally to a military company, and with some persuasion and instruction this tendency could be turned to good advantage. We might, at least, succeed in turning the thoughts of many of these youths toward military subjects, who now never give them any consideration. This would result in the general public being better informed as to our military necessities, something very much to be desired.

It is not clear to me how much benefit is to accrue from the use of non-commissioned officers, as suggested by Mr. Eastman. The National Guard is already giving too much attention to the smaller details of drill to the exclusion of more important matters—discipline, camps, marches and battle tactics. Associating the Regular regiments with those of the National Guard during their summer encampments will probably give better results than anything else. To produce the best effect we should make our model as perfect as possible. Of course, if they will not have us, we cannot force ourselves upon them, but the officers of the Regular Army should try, through the press, to convince the Guard of the necessity for such association. In several States these camps have been tried, but not on a scale large enough to accomplish much. In States like New York, for instance, a regular regiment might remain in camp during the summer, and show by their discipline and real camp life (with all the attendant features of summer manœuvres), what the National Guard regiments should strive to become. The matter of social life between the men of the two organizations need not have, nor should have, anything to do with the subject. In this way different regiments of the Guard, succeeding each other at "short" intervals as they do in camp, might and would receive valuable instruction.

In any reorganization of our forces, with a view to prepare ourselves for war, there should be included something not touched upon by the lecturer and perhaps not strictly within the scope of his paper; that is the immediate formation of depot companies both for the Regular and National Guard regiments. It will not alone suffice to send a large army into the field at the outbreak of war; in all reasonable probability such an army will need fresh material both quickly and frequently. Proper means to recruit it should be devised beforehand, that no unnecessary delay may occur, and in order that the recruit may not arrive at the front a novice to all that pertains to his duties, and, on account of the sudden and very decided change in the habits of life, a ready victim for disease.

IV.

"Notes," "Memoirs" and "History."

Brevet Lieut.-Col. Carswell McClellan, U. S. V.

THE January (1890) issue of the JOURNAL OF THE MILITARY SERVICE INSTITUTION contains a notice of a pamphlet entitled "Notes on the Personal Memoirs of P. H. Sheridan, by Carswell McClellan, Brevet Lieutenant-Colonel U. S. Vols."

This review is something more than the usual literary criticism generously granting valuable space in recognition of a new publication. If simply a critique, no comment could be attempted, and none would be needed. That exposure of reiterated detraction, prepared expressly for posthumous circulation, cannot be justly branded as "kicking a dead lion," may safely be left to the intelligent reader. That neither the degree of knowledge possessed by the writer of the "Notes" as to the notorious restlessness and complaint induced by the duty required of the Cavalry Corps of the Army of the Potomac during the winter of 1863-64, and the spring following, nor the protests and disapproval of the superior and subordinate cavalry commanders, could alter

the conditions necessitating that arduous and harassing duty, and that neither have any bearing upon the method of General Sheridan's representations of his subsequent protests, is manifest. Shiloh, Murfreesboro, Manassas, Chancellorsville, Gettysburg, Spottsylvania and the North Anna will not be entirely without influence in favor of a wise conservatism; and the precise functions of the future cavalry arm may well be left to later consideration after research shall have proved able to formulate the tactical theories of General Sheridan, and experience shall have demonstrated in how far the leading Powers of Europe have been able, or willing, to follow him in departing from "inflexible tradition."

The feature of the review to which it is especially desired to ask attention is the peculiar and quasi-historic statement it advances, as follows:

"Nor was it impertinent nor insubordinate, under the letter and spirit of his assignment by the Lieutenant-General present with the Army, and directing its operations in person, for General Sheridan to express to General Meade his views as to the proper use of cavalry in the field; views which, in spite of inflexible tradition, have recently been adopted by the leading military Powers of Europe. The sooner it is admitted that, while *nominally* 'commanding the Army of the Potomac,' General Meade, upon the arrival of Lieut.-General Grant at its headquarters, became simply Chief of Staff, the easier it will be to deal justly with General Sheridan's words and deeds as the Chief of Cavalry."

This remarkable statement can only mean that, in the opinion of the reviewer, both General Meade and General Sheridan derived the authority they exercised from the Lieutenant-General, and that the presence of their superior at or near the headquarters of the Army of the Potomac, while directing the armies of the United States, reduced the commander of that army to the grade of Chief of Staff, elevated his corps commanders to rank equal with that of their commander, and absolved them from attention to his orders. That, in the JOURNAL OF THE MILITARY SERVICE INSTITUTION, a statement and theory so repugnant to established usage, and as annihilating to discipline, can be authoritatively advanced as professional and tenable, is no light matter. A discussion of the technical points involved cannot be necessary. It is, in truth, extremely difficult to understand how the theory can be established with credit to General Sheridan, who certainly never consented to its application where it would diminish his own authority. Undeniably it is against the controlling authority of a *superior and commanding officer* that the pages of his Memoirs enter protest, and if the authority of that officer was hampered by the overshadowing presence of the Lieutenant-General, the generous appreciation and consideration of a subordinate and loyal soldier could not have tolerated the conduct of which General Sheridan boasts.

Generals Grant, Meade and Sheridan were assigned to definite commands by the President of the United States and derived their authority *from him*. The commission of Lieutenant-General carried with it no inherent authority to remove General Meade from the command he had held for nine months when General Grant arrived in Virginia. Had General Grant, however, desired a change in the command, undoubtedly, it would have been made by the President; and General Meade would have cheerfully acquiesced (Grant Memoirs, vol. 2, p. 117). But we are assured in the Military History of U. S. Grant (vol. 2, pp. 15, 16), that "Grant had no desire for the removal of Meade. * * * The question of Meade's removal was never mooted between the Administration and the lieutenant-general." General Grant repeats (Memoirs, vol. 2, p. 117), saying: "I assured him [General Meade] that I had no thought of substituting any one for him," and in his official report (Memoirs, Vol. 2, pp. 558, 563, 564) he says: "Major-General George G. Meade had the immediate command of the Army of the Potomac. * * * I may here state that, commanding all

the armies as I did, I tried, as far as possible, to leave General Meade in independent command of the Army of the Potomac. My instructions for that army were all through him, and were general in their nature, leaving all the details and the execution to him." In his *Memoirs* (Vol. 2, pp. 117, 118) he repeats the statement. It is impossible to see how General Grant could more emphatically recognize General Meade as actual commander of the Army of the Potomac—including, of course, its cavalry corps.

We have also emphatic assurance that General Meade was entitled to every consideration belonging to his position and rank. General Badeau (Vol. 2, p. 15) states: "The position of Meade was now one of peculiar delicacy. * * * He might very naturally have been discontented; but no manifestation of such a feeling was apparent. He displayed, on the contrary, a marked magnanimity." General Grant corroborates this statement (*Memoirs*, Vol. 2, p. 117) and in his dispatch to the Secretary of War, May 13, 1864, he states unreservedly: "General Meade has more than met my most sanguine expectations. He and Sherman are the fittest officers for large commands I have come in contact with." The pages of the *Military History and Memoirs of U. S. Grant* bear numerous confessions of a similar character, and, finally, General Badeau occupies no less than six consecutive pages (Vol. 2, pp. 186-192,) in the attempt to prove that, as commander of the Army of the Potomac, General Meade was an impediment in General Grant's way—notwithstanding his acknowledged ability; earnestness and magnanimous loyalty.

To maintain in the face of such evidence that, "while *nominally* 'commanding the Army of the Potomac,' General Meade, upon the arrival of Lieutenant-General Grant at its headquarters, became simply Chief of Staff," and General Sheridan "Chief of Cavalry," not only deprives General Grant's authorized historian of a carefully cherished scape-goat, but, also, places General Grant himself in an extremely unenviable position which it is not necessary now to specify in detail. Even the insinuation of "ingenious distortions" and "sinister interpretation" cannot alter the stubborn facts.

And yet, unfortunately, it must be acknowledged that the pages of General Grant's *Military History and Memoirs*, by innuendo, partial truth and obvious misstatement, bear ample evidence that the *JOURNAL* review has formulated what they tender as an insinuation by which it has been hoped to neutralize confessions forced by unavoidable facts. The *Memoirs of General Sheridan* but make the fact more glaring. Having in his publications endeavored to draw attention to this point, Colonel McClellan is indebted to General Rodenbough for the aid given in his frank and concise statement of the assumption upon which the claim of General Sheridan's subordination rests.

Doubtless there are many who deprecate discussion of these points and would prefer that prejudice should stand unanswered until legalized by time, but it is to be remembered that to no sect, or individual, has yet been given authority to voice the wishes of the survivors of our War; to prescribe material from which the historian shall construct his work; or to limit the sources from which the Army of the Republic shall draw its lessons of martial dignity and worth.

Yes; the lithe form of Warren stands very clearly defined upon Little Round Top—and *not there alone*. It flashes through the sulphur clouds at Bristoe. It rises grandly in its unselfish dignity as the gray morning breaks at Mine Run. Unflatteringly it leads his noble corps through the gory mire from the Rapidan to Petersburg, and at Five Forks holds high, and honored yet again, the cross that claims him knight and chieftain true. No shadows will be allowed to rest upon the quiet grave beside the sea where sleeps the hero who, in life, was requited with a broken heart instead of the honors he had won. The sun of truth is rising strong and clear.

V.

"Mackenzie's Last Fight."

Major G. W. Baird, U. S. Army.

IN Captain Bourke's most interesting narrative of "Mackenzie's Last Fight With the Cheyennes"—January number of the JOURNAL—appears the following: "The operations begun in February, 1876, * * * and maintained throughout the ensuing summer and fall, by various large commands under Crook, Terry, Gibbon, Miles and others, had not been specially fruitful in satisfactory results." Whatever the justness of it as a general criticism of the spring and summer campaign of 1876, the truth of history and justice to the troops engaged require a correction in one particular. Nearly a month before the expedition, of which Captain Bourke writes, left Fort Fetterman, General Miles with the Fifth Infantry, three hundred and ninety-eight rifles—marched out from cantonment at mouth of Tongue River, against the hostiles under Sitting Bull. This little force attacked and routed Sitting Bull's following on Cedar Creek—a northern affluent of the Yellowstone—pursued them to the south side of the Yellowstone, and, on the 27th of October—nineteen days before the "Powder River Expedition" left Fort Fetterman—compelled the surrender of over four hundred lodges—two thousand Indians.

This success, important in itself and at any time, has unique interest and value as the first considerable success after the disasters of the previous summer, and as the beginning of a series of victories which brought the great Sioux War to an end.

BOSTON, MASS., January 28, 1890.

VI.

"A Number of Uncommon Excellence."

From Colburn's United Service Magazine (London).

IN the first article of the November number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION (New York), "Major C. B. Greenleaf, Surgeon U. S. Army," enters minutely into various methods of noting personal peculiarities of men enlisting, with a view to their subsequent identification if they desert. The difficulty of obtaining positive evidence of identity from photographs, owing to the changes in appearance caused by wearing or removing hair or beard, by altered states of health, etc., are stated, and some instances of total failure are given. The defects of two other methods, the "measurement and record of unchangeable anatomical parts," and the "record of permanent bodily markings," are then fairly demonstrated. Major and Surgeon Greenleaf expresses his preference for testing personal identity by the reproduction on paper of the impressions of the ridges and furrows on the skin of the finger tips! These impressions are got by pressing the finger tips lightly on a surface coated with black paint or printer's ink, and then pressing the inked fingers on white paper. The difficulties of carrying this plan successfully into practice seem infinitely greater than those attending the use of photography.

Lieutenant Hawthorne considers several plans for inter-oceanic communication across Central America, with reference to their strategic importance to the United States. His article is interesting and instructive.

"The Use of Railroads in War," by Lieut. Carl Reichmann, amply repays perusal. It reviews the progress of what may be called railway warfare from 1859, when railways were used by Austria in concentrating her troops on her northern frontier, in anticipation of war with Prussia. Much of the article is devoted, naturally, to the use, the breaking up, and the repair of railways during the American Civil War.

A well-written article on "Military Training of the Regular Army of the United States," by Lieutenant Burnham, contains some passages of general interest, though the greater part is applicable only to the peculiar constitution and circumstances of the army to which it refers. His views of drill, tactics, manœuvres and discipline are practical and progressive. But why will so many American writers call the "regular" soldier all through his service "the enlisted man," as if joining the Regular Army made him a special variety of the human race? Lieutenant Burnham thinks that officers should be selected for the engineers and artillery chiefly on account of their mathematical attainments, but that for the other branches mathematical knowledge is of minor importance. Writing of military sports and amusements, he says: "I see no good reason why at least one evening each week should not be given to the men for the purpose of engaging in theatricals, or devoting it to such other amusement or recreation as they see fit. In this manner the men would have no time to get drunk, no occasion to complain, and health and vigor would be imparted to both mind and body, thus punctuating with dashes of pleasure the more confining and arduous duties of their military life."

First Lieutenant Reilly's proposals for the "Revision of Infantry Tactics" certainly do not err in the direction of excessive simplification. His complicated organization and movements are unsuited to the conditions of modern war.

Reprints and translations, notes, comments, and reviews, make up a number of uncommon excellence.

VII.

"The Use of Railroads in War."

(From Letter of Correspondent in "Revue du Cercle Militaire," translated by J. C. B.)

I HAVE just read with much pleasure a study on the use of railroads in war, by Lieutenant Reichmann, 24th Infantry, U. S. Army.

This article appeared recently in the JOURNAL OF THE MILITARY SERVICE INSTITUTION, and you know that in order to secure entrance to its pages the authorization of a committee of army officers is necessary.

I think that, with the exception of certain points which seem open to criticism, it merits a rather detailed *résumé*.

In the first place he remarks that the Germans, Italians and Austrians have taken care to have the same R. R. gauge; their carriages can thus run with all speed over the roads of the countries of the triple alliance. Russia on the contrary, for military reasons, has taken a much wider gauge, 1 m. 524. But the defensive advantage is not great because it is easy for the invader to insert an intermediate rail for lessening the gauge, while it will be less easy for Russia to enlarge that of her enemies. The author claims that the Germans were much inconvenienced in 1870 by the difference in R. R. gauge existing between France and Germany.

I believe that the inconvenience on this account was practically nothing, for had you not formerly German carriages running rapidly over your lines and have you not the same still? Then too the width of track in the two countries, if not exactly the same, is at least sensibly so, and could hardly cause serious embarrassment. The author recommends to the invader the seizure of as much of the enemy's material as possible, or if that cannot be done, to choose material appropriate to the gauge, and cites several catastrophes which have resulted from this lack of precaution in the use of material.

How many trains can pass over the lines on single and double tracks is the next question treated. There, again, I think I discover an error. The author affirms that in 1870 no more than eighteen trains were sent over double track lines per day. Now

I have read lately several works which all assure me that this number can be easily exceeded, notwithstanding the time taken for embarking and debarking. To cite one example : The single line from the East has furnished more than double the number of trains given by Lieut. R. during certain days—and heavily laden.

If we can credit this study, what, above all, caused the primary advantage of the Germans in 1870 was that nine of their lines converged upon the menaced frontier, and brought there troops from all parts of the country ; while the French had at their command only four lines radiating from Paris and diverging more and more as they approached the frontiers. We should not be surprised, then, that the French concentration was behind that of the German. From that cause came the first defeats.

The author then speaks of the employment of lines after concentration. He says in regard to this that our numerous railroads form our only system for defending the coasts by transport to the threatened point, at the proper moment, of troops held in reserve at a few points, thus avoiding a fatal dispersion of strength. But here, again, I will observe to the author that the coast lines should not be easily destroyed by the enemy's fleet, an inconvenience presented, for example, by the Italian coast system. Unless such destruction is prevented, we cannot rely with certainty on this means of defense.

Lieut. R. explains, further on, that without the railroad it would be nearly impossible to transport the enormous quantities of food, ammunition, etc., necessary for modern armies.

The War of 1870 without railroads would hardly have been so disastrous to the French. The enemy's progress would have been much slower and time would have been given to recover from first reverses.

The author concludes by saying that railroads tend to facilitate war, to intensify it, and, in consequence, to abridge its duration. The happy ending of a campaign should be a presage of final success, for the proper use of railroads should give the adversary no time to rally.

Reviews and Exchanges.

Wallenstein.*

THE author, who in this as in all his military criticisms, shows deep and comprehensive study—carries us with him to his conclusion of “showing what an extraordinary man he [Wallenstein] was at the head of armies of his own creating, and in the administration of everything necessary for their maintenance and success, as well as for his own success and rise.” He would evidently deprecate the charge of treason against his hero. But the base assassination, approved or directed by Ferdinand II., scarcely disproves the charge. As the author admits, Wallenstein was too high and strong to be brought to trial. The consensus of public opinion in all subsequent time has been against the purity of his aspirations. It dare not be said that he was a patriot: he only came to the defense of his country on terms too humiliating to his sovereign to be justified by the situation. His greed and ambition were unbounded. No high or unselfish principle can be predicated of him. At last between him and Ferdinand the Spanish choice lay, *Si sea de V., ó de mi, primero yo!*

It is not to be wondered at that the popular world were not dazed by the brilliance of his feats, and have not rated him at his worth as a commander. The circumstances of the times, the disorganized state of the country, social, religious and political, conjoined to evolve Wallenstein, as afterward Napoleon was produced. True, Napoleon found an army to his hand, but Wallenstein found a multitude for whom to soldier was easier than any actual mode of life at their command. Though in fight capable of what any man would dare, yet he made no brilliant victories. He paralyzed his enemies by a Fabian system of manœuvres, accomplishing wonders.

It is scarcely fair to consider Gustavus Adolphus worsted by Wallenstein. There appears to have been a terrible entanglement of cross interests involving both Gustaf and Richelieu. This, a Roman prelate, true no doubt in heart to his Church, was eager for heretic secular help; while Gustaf, probably not less true to the enlargement of German Protestantism, stayed his hand at the question of subsequent empire. Had he only looked to conquest, we must not assume that he would not have advanced at the proper time on Vienna. Neither ignorance nor fear certainly deterred him. Whether judicious or not, as we now view it, it must needs have not suited his policy held at the moment, which in fairness may be referred to his conceived duty to the Protestants of the League.

It is true that Wallenstein checked him at Nuremberg, and the author's proposed scheme for Gustaf to have held Nuremberg by a portion of his army, sending the rest to raise the Protestant districts against Vienna, appears so feasible that it is hard to

* This is a reprint of papers first published in *The College Student*, Franklin and Marshall College, Lancaster, Pa., under the *nom de plume* of “ANCHOR.” In the pamphlet these papers are preceded by a most elaborate array of recondite historical notes, immensely valuable to the student of those times. By Gen. J. WATTS DE PEYSTER. New York, 1889.

deny its conception to a man of Gustaf's ability and reliance in his army. I think we are forced to conclude that it was not Gustaf's policy to strike then at Vienna.

Beyond this he appears to have been forced by his death rate to bring on battle. It certainly, with our lights, appears to have been unwise to attack Wallenstein's intrenchments.

But when they met more fairly at Lutzen, though through his imprudent rashness Gustaf fell, Wallenstein was certainly defeated.

It would be vain to criticise the military accuracy and deductions of the author. As an administrative man and organizer he makes out an excellent case for Wallenstein's peeriship. People's prejudices will in a great degree determine them as to the superiority of his generalship over Gustaf.

The pamphlet appears to be most valuable to us as a comment on our own generals. The errors of Gustaf are always paralleled by Sherman, Grant, or Franklin, etc. When Tilly succeeded it was because he had inferior troops before him, "like Lee had opposed to him," or had generals opposed to him "hampered by politicians, or sacrificed to half-hearted support like Pope."

The author is freed from the glamour of Napoleon. He points out his military errors freely, and estimates his claims fairly.

The author is evidently not afraid of that which brought Wallenstein "to grief," viz. : a dominant priesthood. He is very impartial of his sword as against papal, jesuitic, anglican, or Scotch anathema.

Grant at Cold Harbor, and Franklin at Fredericksburg, come in for unqualified reprobation.

The style is sometimes obscure. "In some respects Wallenstein was a more wonderful personality than Gustaf, and he brought forward subordinates who were equal to Turenne, judging that general by his connection with the French period of the Thirty Years' War, and even as executives to Stonewall Jackson, while he himself was vastly superior to Grant, Sherman, Sheridan and Lee." [McClellan presumably excepted. In fact he is ignored by the author, either for praise or blame.—J. H.]

The author is fertile in deductions and here shows his long recognized ability to get at the pith of a military principle. One is striking. "The soldiers who are vastly the best in the beginning soon teach their style of game to the adversaries, and show them how to play it." And yet it is not held that at any time Wallenstein with 25,000 of his best could have stood before Gustaf with 25,000 Swedes.

The author, we think, steps aside to deprecate the glory of our own later heroes who were in at the end of the chase. It cannot be said fairly that Grant and Sherman and Sheridan did not work hard all the way through the War, and did not do their full share in weakening and preparing the enemy for their final victories. It is believed that their admirers in no way forget those who struggled and fell by the way.

En passant he raps over the knuckles those who would rank Lee among the great generals of history.

In matters of religious belief he impresses the reader with a position that there is no choice between the acceptance of narrow dogmata on the one hand, or of agnosticism on the other.

J. H.

The Campaign of Königgrätz.*

In the May number of the JOURNAL M. S. I., Lieutenant Wisser reviewed an excellently written *brochure* by 1st Lieut. A. L. Wagner, 6th Infantry, on the campaign of Königgrätz.

The favorable reception accorded his first effort has induced the author to revise and amplify it so as to include an historical sketch of the entire Austro-Prussian War.

This has added much to the reader's appreciation of the general events transpiring in the course of the struggle, and renders the work a more complete account of a campaign, which coming so soon after our own War, lasting but two short months, and preceding by but a few years the great struggle between France and Germany, has failed to attract the attention it deserved among military students in general.

Lieutenant Wagner's object in writing the book, has been, 1st. To give a brief, but accurate historical sketch of a great campaign to which but little attention has been given in this country. 2d. To make a comparison of some of the military features of the War of Secession, with corresponding features of this European War which occurred one year later.

In other words, the book finds its place mainly as an example of a campaign studied in the light of our own War. This phase of the subject is one of peculiar interest to the American student. Happening so closely in point of time, the two wars offer a fair comparison between the efficiency of the armies engaged; their tactical methods; their employment of cavalry and artillery; their use of railroads and the methods of supply and transport resulting therefrom, the telegraph, etc., etc.

Remembering the extent of the theatres of War in the two countries, and that our own was a Civil War and not a National one, we believe with Lieutenant Wagner that such a comparison cannot result wholly to our disfavor, whether we seem to view the generalship and soldierly worth through Confederate spectacles *à la* Lord Wolseley, or whether our sympathies incline us towards the Northern side of the contest; and that the germs of many things regarded as new in European armies may be found fairly well developed in the latter part of our Civil War.

In regard to the campaign itself the author claims, and with much show of justice, that von Benedek's strategy was bad from the beginning, but that his dispositions on the decisive field of Königgrätz were in the main good, the unfortunate position of his right being due to mistakes of subordinates: That though the needle gun was a great source of strength to the Prussians, it did not really affect the result of the campaign at all, the Prussian strategy and tactics being so much superior to those of their opponents that disaster would have quickly overtaken the Austrians if the Prussians had been no better armed than they: That the tactics of Sherman's infantry was more nearly a prototype of the present attack formations of all European armies than was anything that could be found in the tactics of the contending infantry in 1866: That the Prussian artillery was impotent, and that the action of the cavalry on both sides was feeble and unskillful: That great raiding opportunities were thrown away, and incidentally that neither Von der Golts nor Prince Hohenlohe has grasped the true idea of American cavalry raids.

The author concludes: — "Thus ended the great battle of Königgrätz. It is not only on account of its great and far-reaching results that Königgrätz must be rated as one of the greatest battles of the world; in point of numbers engaged it was the greatest battle of modern times; for the two contending armies aggregated nearly half a million men. In this respect it exceeded Gravelotte, dwarfed Solferino, and even

* *The Campaign of Königgrätz.* Lieut. Arthur L. Wagner, U.S.A., Fort Leavenworth, Kansas.

surpassed the "Battle of Nations," fought on the plains of Leipsic fifty-two years before."

The book is handsomely gotten up, the typography excellent, the maps and general arrangement good, and Lieutenant Wagner's well-known ability as a writer quite sufficient guarantee in that regard.

We commend the book to the careful attention of our readers.

J. C. B.

Tenting on the Plains.*

"Tenting on the Plains" is essentially a story of the "family side" of General Custer's life, and will therefore be of special interest to those who knew and loved him. There is much, however, of interest and information for the general reader.

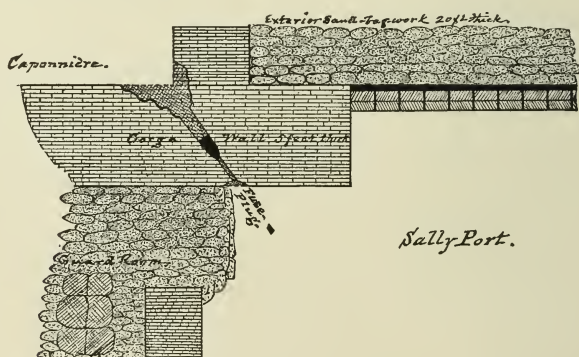
Nearly half of the 700 pages are devoted to a description of the life and troubles in Texas and the Southwest during the "reconstruction period" immediately following the great War.

The story is simply but charmingly told, and the reader's mind is apt to wander from the contemplation of the deeds of him whose life the pages describe to lose itself in admiration of the pluck and perseverance displayed by the author in braving discomfort, hardship, and even terrible danger in order to be nearer the object of her love and affection.

E. M. L.

The Strange Performance of a Fuse-plug at Fort Sumter in 1863.

The following is a fact vouched for by the author of a forthcoming volume upon the defense of Charleston Harbor in 1863-65.†



It was on the fourth day of General Gillmore's first bombardment that a singular incident occurred at Fort Sumter. A rifle shell with percussion fuse had struck the gorge-wall, six feet above its base, to the right or east of the heavy sand-bag work, protecting the sally-port on the exterior, and in the nearest corner of the caponnière; but its

* *Tenting on the Plains*. By Mrs. E. B. Custer. New York: Webster & Co., 1887.

† "The Defense of Charleston Harbor, including Fort Sumter and the Adjacent Islands, 1863-65," by John Johnson, formerly Major of Engineers in the service of the Confederate States. With original papers in appendix, full official reports (both sides), maps, and numerous illustrations. Charleston, S. C.: Walker, Evans & Cogswell Co., Publishers.

slant direction of fire, an angle of nearly 40° , had turned it toward the open arch-way of the sally-port, and away from the guard-room, packed with wet cotton bales and sand, which would otherwise have stopped it. Yet it had not penetrated through to the interior; only the fuse-plug had done so, making its own narrow track, and leaving the shell buried in the wall some twelve inches behind it. The fuse-plug had passed into the open space and through it into the parade, where it was found. Had the shell been found on a line two feet to right or left, the incident could not have occurred; for though the plug might have been forced through the wall into the guard-room, it would never have been discovered, being lost in the filling of the room. And, if the shell had entered more to the other side, too much brick wall would have opposed itself for the energy of the fuse-plug to overcome.

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OUR EXCHANGES.

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OUTLINE OF A MANUAL OF INFANTRY DRILL.*

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I N the month of December, 1886, I made official request for a Board of Officers to examine and report upon a complete system of infantry drill which I had devised.

The reply was that when a board should be organized to *revise* the infantry tactics my system would be submitted.

I endeavored to convince the authorities that such action would not accomplish the purpose, for if the board were organized to revise the tactics it could not consider, officially, any system offered.

I was then informed, verbally, that there were other officers who wanted such action, to which I replied that my application was as much in their interest as in my own and that it was in the interest of the Army at large; that a board should be ordered to consider every system presented, not only to encourage those who had devoted their time and thought to this object but to stimulate others and to acquaint the whole Service with whatever of merit or defect was to be found and thus help the growth

* Read before the West Point Branch of the Military Service Institution, February 26, 1890.

of that which must always be a matter of evolution. I well knew that several officers had been hard at work and it was not justice to them or in the interest of the Service that their efforts should be ignored.

Doubtless all other applicants presented similar views.

The result was that a Tactical Board was organized to *prepare* a system.

When it asked for my manuscript of the work herein sketched I made official request that the board be authorized to criticise it, and I know that the gentlemen on the board were willing to undertake the task.

The request was refused.

To repeat: Officers should generally be made acquainted with what has been attempted in the development of an *American* system of infantry drill, and this must be my apology for asking attention to this sketch of my own effort in that direction.

EXTRACTS FROM WELL-KNOWN WRITERS.

General Hamley.—Manœuvres are the quick, orderly change of highly-trained and flexible masses from one kind of formation to another, or their transference from point to point of a battle-field, for purposes which become suddenly feasible in the changing course of the action.

Col. R. Home.—Drill is a means to discipline, but drill is not discipline, which may be defined as obedience to superiors.

Capitaine Vial.—If only 100 men have to be moved, certain subdivisions are requisite to give them a cadre and commanders. There must be some definite instruction for both men and officers; there must be principles, rules and theories.

Jomini.—It is absurd to call a body composed of twelve battalions a division at the same time that two companies are termed a division. I do not pretend to say if it was a confusion between these two words that caused the formation of the heavy masses at Waterloo. However that may be, it is requisite that perfectly distinct terms should be used to denote a division of twelve battalions and a division of two companies.

IMPORTANCE OF THE INFANTRY ARM.

Colonel R. Home.—In armies, infantry undoubtedly takes the lead, and to its action that of the other arms must be subordinated.

An intimate knowledge of infantry tactics consequently becomes most essential for officers of the auxiliary arms,—cavalry, artillery *and* engineers, it being their duty to aid and facilitate the action of the infantry; and they must seek, not what is most advantageous and best viewed from a cavalry, artillery, or engineer point of view, but what is best, viewed from an infantry point of view.

* * * * * * *

Infantry is undoubtedly the mainstay and the backbone of all armies, whether it be in the light of numbers, or its action on the field of battle. Its fire is more deadly than that of artillery; its action is sure while that of cavalry is fitful.

On the infantry of an army the brunt of the fighting falls, it suffers more in action and more on the line of march. Artillery fire but to pave the way for an infantry attack or to check an infantry advance. Cavalry charge but to confirm an infantry victory or to check a pursuit. Engineers open roads and make bridges to allow infantry to pass; they strengthen positions and throw up earth-works but to protect and cover the infantry, or to enable a small body to resist a superior force.

On infantry tactics the whole superstructure of military operations must be built.

LOOSE AND CLOSE ORDER.

Col. Home.—Modern fighting is not *loose*, although it may be individual.

Von Scherff.—We must contrast the expression “individual” with that of “close order.” We mean by the latter that formation of troops when each man has a fixed place which he must not leave, while by the former we mean a formation that assigns each man his place only in a general way, leaving to the man a latitude within certain limits on his own initiation to modify or alter it.

SUFFICIENT FORCE.

Colonel R. Home.—There has been a gradual tendency * * * to reduce the number of men occupying a given piece of ground. Concentration is undoubtedly strength, but we must clearly understand what concentration of force, in its military sense, means. It means the assembling on a given point, of a mass of units *sufficient* to deny the use of that point to the enemy if (we

be) acting on the defensive, sufficient to drive the enemy out, if acting on the offensive.

But if the *sufficient number* be exceeded, concentration becomes dangerous, becomes unwieldy accumulation. * * * Further, when military units are massed together or concentrated, it must be borne in mind that if that concentration exceeds certain limits it prevents the proper use of the men's arms.

The result of the gradual appreciation of these facts is, that the number of troops requisite to occupy a position of given length is now much less.

Von Scherff.—Experience has demonstrated that the principle hitherto considered important of reinforcing a line of skirmishers only little by little, is more dangerous and costs more men, than the use of a sufficient force from the moment the troops are within easy range.

What is meant by a sufficient force?

Taking into consideration the increase of the defensive power, we may reply: As many men as the ground will permit to be placed in line, so that they may use their weapons efficiently. * * * Since each man, to use his rifle freely, requires one yard and a half of space, it follows that the maximum number of men that can be placed in the line of skirmishers, should not exceed one man per yard and a half. * * * Every man in the line of skirmishers who on account of a want of space cannot take his share of the firing is absolutely hurtful, at the same time that he increases uselessly the chances of loss.

EXTENT OF FRONT.

Von Scherff.—What is to determine the extent of front to be given to a fixed number of men?

The distance may be arrived at as follows: one-half or two-thirds of the whole force as main body, and one-half or one-third as preparing the attack; one-half the last number spaced at one yard to one and a half yards, will give the required front.

Colonel Home.—The formation for attack is one which while occupying a front quite as long as that formerly held by a deployed line, will do so with fewer men and will give commanding officers means of feeding the front; or in other words, the area of action of a commanding officer will be as long and far deeper than formerly.

WHAT IS MEANT BY LINES.

Colonel Home.—The fight in front must be incessantly fed from the rear and hence it follows that the troops first pushed on must be composed of a portion of the same body in rear. This immediately brings up the question: What is meant by lines?

From a line of two deep it is impossible to feed a fight or support the skirmishers, for the line of two-deep is little more than a compressed line of skirmishers. Hence the words "first-line," "second-line," must not be taken as meaning either a line of skirmishers or a line of two-deep, but the troops actually fighting in the front. If three battalions be taken as an example, one battalion skirmishers, one in support and one again behind it at a further distance, the whole collectively form the "first-line," the command extending from front to rear over a far greater extent of ground than formerly.

The first or fighting line must then be formed so that it carries its own reserve or support with it, and when spoken of as the "first-line" it is not to be regarded as a deployed line of infantry.

POSSIBILITY OF APPROACH IN CLOSE ORDER.

Von Scherff.—From the first deployment until the actual collision, the attackers are exposed to the fire of the defenders. * * * The artillery, and in a short time the infantry, of the defenders become the objects of the attacker's fire. It follows that the defender's fire will be diverted from that portion of the attacking force which composes the main body (the true assaulting party).

The more the troops charged with the preparation of the attack succeed in drawing the defender's fire on themselves, the better they will do their work.

The defense will seek not to be so led. But it cannot help itself. It may direct a portion of its fire on the supports and the batteries, but the fire on the main body will be much diminished.

If the skirmish line of the attackers be not checked, the defenders will be destroyed by its fire, aided by that of the attacking artillery.

If the defenders concentrate fire on the skirmishing line they facilitate the advance of the attackers' main body.

This is the dilemma on which the possibility of attack mainly rests, and hence the necessity of giving considerable force to the troops preparing the way.

Colonel Home.—The fire of the assailants' artillery and the fire of this skirmishing line will have the effect of drawing on them both the enemy's artillery and infantry fire, *and hence it becomes possible to bring up the main body in a much closer formation than is often supposed.*

Colonel Newdegate.—When the skirmishers are involved in fire action with the enemy, close detachments can come forward with insignificant losses.

FORMATION OF MAIN BODY.

Von Scherff.—At this stage (the second zone, about 1200 yards from the enemy), if the artillery of the defense does not direct its attention exclusively upon the artillery and troops engaged in preparing the attack, it will begin to direct *a portion* of its fire on the main body. The whole ground will thus be swept by a nearly evenly divided fire; the effect, therefore, unless the attackers be very badly handled, and so formed as to induce the defenders to concentrate their fire on certain points, will be nearly the same, no matter in what formation the main body may be.

The more a mass of men is concentrated, the more confidence is given in its force and the greater the number of men likely to show a good example and impress a motive power on the whole mass.

But a heavy loss occurring unexpectedly and all at once, demoralizes the mass more than if the same loss is distributed over some time and in different places. * * *

The question then is: What front must we give and what depth can we take for the troops of the principal body at this moment?

The size of the fractions into which the main body must now be divided must be such that the leader can exercise a personal influence, and that they can move easily to the front and yet be sufficiently compact to give the soldier the idea of solidity.

Colonel Home.—The formation requires to be such as will enable the men to advance with speed without being demoralized; and this appears to be more likely to be attained by small columns than by either a line or extended formation.

ACTION OF THE SUPPORTS.

Colonel Home.—The duty of the supports is * * * to keep

the (firing line) up to the "sufficient number." Hence the officer commanding the supports must watch the front. The nearer to the skirmishers the supports are the more they will suffer, but if too far off they will cease to act as supports. * * * As the skirmishing line advances and gets into the zone of aimed fire, or some 600 to 700 yards from the enemy, the supports must be freely pushed on * * * and as the advance of the skirmishers * * * by successive rushes will be slower than that of the supports, the latter will close on them, and the main body will also close somewhat on the supports.

As the fire is kept up the main body will advance, and when it comes near the line of supports the latter should rush to the front and join the skirmishers.

Von Scherff.—The moment the main body arrives near what is left of the line of supports, they should dash to the front and join the line of skirmishers, in order to give the impulsion requisite to cross the last and most dangerous zone of all, and finally give the assault.

LAST PHASE OF THE ATTACK.

Colonel Home.—If an attempt be made to realize the state of affairs at this period of the attack it will be seen that the skirmishers, reinforced by the supports, are within 250 to 300 yards of the enemy; that the main body is some 300 yards in rear of the skirmishers; the divisional artillery, perhaps, some 1200 to 1400 yards off, supported by a portion of the corps artillery, the remainder of the corps artillery occupying advantageous places up to 2000 yards off, and all bringing a heavy cross-fire on the enemy's position; the second line of troops following in rear of the main body of the first line, perhaps 500 to 600 yards from it. A tremendous fire is maintained by the now thickened skirmishers and the whole front is covered with clouds of smoke.

Such a state of things cannot last long. The skirmishers may get a hundred yards nearer and the main body getting closer to them must prepare to carry the position.

Gradually converging, the various portions of the main body must push rapidly to the front and drive the enemy out; while the second line seeing the advance and hearing the cheers should push rapidly on to support the attack, meet the enemy's reserves and confirm the success.

SKIRMISHERS MUST ADVANCE IN THE ASSAULT WITH MAIN BODY.

Von Scherff.—The idea of leaving the skirmishers lying down while the main body rushes to the assault is contrary to the fundamental principles of the attack, which is that all the disposable force should be applied. Leaving them behind really leads to nothing. They could not fire, they could not collect and reform the *débris* of troops crushed by the enemy's fire. They have done and suffered too much for that.

Judging by all experience they must push on with the rest.

To leave them lying down is in the most favorable case a useless course; generally it will be a dangerous one.

SECURING THE POSITION.

Colonel Home.—The moment the position is carried every effort must be made to hold it. The troops should be reformed. A heavy fire should be poured on the enemy as he retires, and the second line following rapidly, must endeavor to occupy the ground. Coming up in regular order they can do so far better than troops whose nerves have been wrought up to the highest pitch of excitement by a successful attack.

STRENGTH OF A COMPANY.

Colonel Home.—Taking into consideration that the size of the company is limited by the number of men that can be influenced by one man, it appears that the Prussian system of four companies to a battalion is correct. * * *

The more personal intelligence there is distributed through a body of men, the larger the number of officers there are in that body trained and competent to lead it, the more efficient will that body be when placed in the difficult positions of actual combat: taking this, and the fact that the Prussian proportion of officers leaves no margin for sickness or loss, and that the front of a Prussian company is, from the fact of its being three deep, smaller than that of those nations which habitually form their troops two deep, * * * it would appear desirable to reduce the size of the companies considerably below the Prussian standard. * * * It should be remembered that the Prussian company was the result not so much of tactical, as of economical motives. * * *

NECESSITY FOR CHANGE IN OUR SYSTEM OF INFANTRY DRILL.

Our war was the end of the muzzle-loading period; the Austro-Prussian war was the birth of the breech-loader; the Franco-German war opened all eyes to the necessity for open-order fighting; the Russo-Turkish war heralded the advent of magazine rifles as an offset to machine guns.

We can never again march solid first lines to the attack under heavy fire, as at Fredericksburg or Cold Harbor.

If the touch of the elbow, *id est*, the solid line, is to be instantly given up under fire, why retain it for manœuvre?

If the actual fighting in attack must be in open order, every man for himself, why burden his action with the restrictions of what he should do as number four of the front rank of a set of fours, in contrast with what he must do as number four of the rear rank of the same set of fours?

All authority recognizes the necessity for a firing line in open order, for replenishing that line and for assuring it of constant support; for pushing it ever onward, and consequently for guarding its flanks; for assimilating every-day practice to what takes place on the battle-field.

Authority also recognizes the desirableness of having men who are in a life and death struggle feel that their own well-known comrades are at hand, to reinforce and help them in a tight place, or to clinch a hard-earned success.

While it is deemed impossible to avoid the ultimate mingling of different organizations in the course of a protracted contest, it is possible to postpone such mixing, and even to confine it to fractional portions of a firing-line.

Every system of drill now seeks to enable a captain to handle his company without looking to some other organization for help at the first pinch.

We must start with this main idea; with another that the individual man need never be numbered; with a third that the man himself is a unit and not one-fourth of a unit; with a fourth idea that troops in any formation should be able to march with plenty of elbow and leg room, even in what is termed close order, and that they should be able to lie down in line or in column, at full distance or in mass; with a fifth idea that linear elasticity should not be confined tactically to skirmishers, but that extension or contraction shall be tactical with the main body also, varying between the touch of the elbow and *any* desired interval; with a

sixth idea that, whether a company be in line or in column, it should be able to deploy with equal facility; finally, when a lot of men "fall in," there should be no time lost in *calling off*.

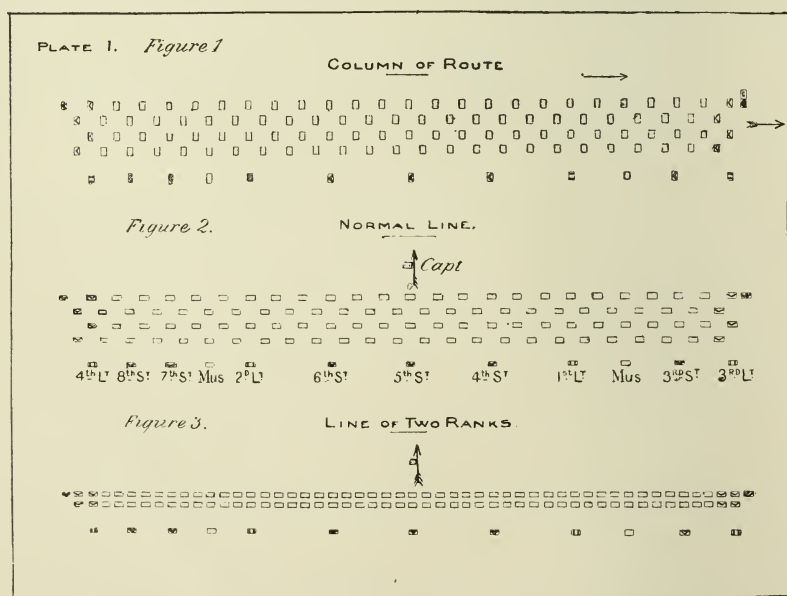
In the presence of many officers a hundred men were taken to represent a company on the war footing instructed in the proposed system. They were made to scatter, as a lot of tired men will do, and to lie down, as if on each side of a dusty road. Under such circumstances what becomes of a set of fours?

Three commands were given, timing their execution by the watch, viz.: to fall in, to deploy, and to begin the firing.

In one minute these one hundred men had formed in ranks, had deployed systematically one hundred yards to the front, and each man was in proper position firing.

OUTLINE OF PROPOSED SYSTEM.

In this system, the company and battalion manœuvres, in close order, are all substantially the same as in our present system. The deployment of skirmishers, however, is essentially different, and may be executed from any formation in line or in



column. It is also more simple, and, during its execution, on an emergency, the fire of one-fourth the force may be instantly opened, while the other portions are proceeding to their positions.

At the command *fall in* the company forms in four ranks, in what is termed the *column of route*. The distance from the back of one man to the breast of the next man in any one rank is fifty-six inches, but, if so ordered, it may be taken at thirty-two inches. The first rank is that which is farthest from the file-closers. The men in the second rank are each opposite the interval between the men in the first rank. The men in the third rank are respectively abreast of those in the first rank. The men in the fourth rank are abreast of those in the second rank. (Fig. 1.)

If the company be now faced to the left, it is in what is termed the *normal line*. (Fig. 2.)

All close order manœuvres for the company or battalion are performed in *column of route*, or in *normal line*, and each man has all the leg and elbow room he needs in marching.

The command *fall in* may be followed, without further ado, by the command to deploy as skirmishers, or to march at once to any point, or to stack arms, and no time is lost in counting fours.

A company or a battalion, at any moment while manœuvring at close order, can lie down without disturbing its tactical formation, in line, in column of route, in column at full distance, or closed in mass.

In what is termed the Company Field Drill the captain is a battalion-commander on a small scale.

Each of the four ranks has its assigned officer, non-commissioned officers and privates, so that each man in succession shall know when the obligation to exert authority falls upon him in the absence of his superiors, by casualty or otherwise.

The *normal line* forms *line of two ranks* by closing files to the front, the first rank standing fast, the men in the second rank stepping into the intervals in the first rank, the men in the third and fourth closing to cover their respective file-leaders. (Fig. 3.)

In *line of two ranks*, for firing, the rear rank takes a side step to the right, thus bringing each man opposite an interval in the front rank.

The line formation may have any extension, from the touch of the elbow, if desired, to three or more times the front. When thus extended the company can fire lying down, by file, by company, or by rank.

The manœuvres of the company in close order are so similar to the present system that it is not necessary to describe them.

The movements have all been practically illustrated on the drill ground.

For street fighting the first rank of the normal line advances in line; the second rank faces to the left and files to the right and will reply to any fire coming from the houses on the right; the third rank faces to the right and files to the left similarly repressing fire from the houses on the left; the fourth rank is in line ready to face about to protect the rear. Coming to a cross street, down or up which it is necessary to proceed, the company square faces to that flank, each rank performing the resulting task allotted to it.

In campaign, marching in column of route and a necessity arising for hurrying cavalry or artillery along the road, two ranks may march on the left of the road and two ranks on the right side without in the least interfering with the rapid and systematic deployment if suddenly called upon. Escort duty to a wagon train may be similarly performed.

COMPANY FIELD DRILL.

For this drill the captain notifies the company in order that the officers and men may don suitable field uniform.

Beyond thorough acquaintance with the methods of deployment but little of the important part of theoretical training can be accomplished on the parade ground. The captain, therefore, makes formal request, if necessary, upon proper authority for time and opportunity to exercise his company on suitable ground. He selects that which is broken and diversified, and he uses every resource to accustom the men to appreciate and improve the accidents of ground. He sets the example and requires his officers and non-commissioned officers to do likewise in showing indifference to personal discomfort, and he must be ready at all times to undergo the fatigue and exposure without which this course of instruction must fall short of its purpose.

The methods of deployment being learned, every movement thereafter should be for a definite purpose upon a position supposed to be held by or against an enemy and the men should be made to understand the object of what is done.

The officers and non-commissioned officers enforce the directions given by the captain for moving *on certain designated points* and for seeking every kind of shelter, pointing out such and compelling its proper use if not readily perceived by the men.

The colonel or other commanding officer requires the companies to oppose each other by approaching from distances of three thousand yards if attainable, for the purpose of habituating officers and men to the appearance of opposing lines at varying distances and affording those in each line a chance to judge of the efficiency of shelter used by their opponents and, from experience, to learn how best to effect a turning movement unobserved.

The commanding officer also requires all troops to practice the duties of advanced-guards, rear-guards, patrols, out-posts, etc., on ground suitable to show the use of such formations. He frequently requires two companies or two battalions to move out by different roads with orders to keep up their communication throughout the march, or to watch each other's movements as if made by an enemy.

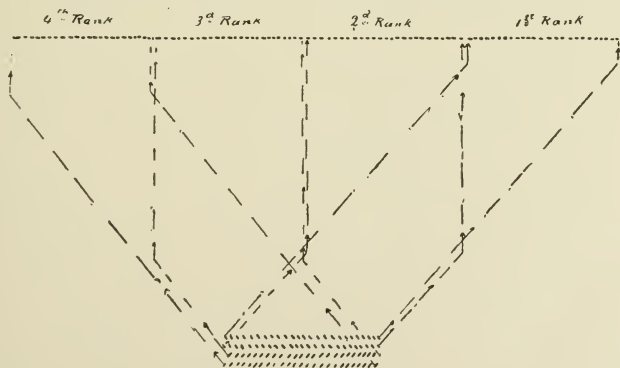
At the preparatory command for deployment, officers and sergeants take assigned positions in the several ranks.

The company deploys either from normal line or from column of route; forward or by the flank; all four ranks, or one rank, or more than one, as the captain desires. The chiefs of the several ranks give the necessary commands in the different deployments.

Plate II.

Company Field Drill.

Deployment from Normal line forward spreading from the centre.



Being in *normal line* to deploy forward, spreading from the centre, the first and second ranks oblique to the right, the third and fourth ranks oblique to the left, the first rank lengthens the step slightly.

As the third and second ranks disengage from each other,

they move forward by command of their respective chiefs, who place themselves wherever most convenient to superintend the deployment; the second rank shortens the step till the third rank is abreast of it; the first rank continues to oblique to the right until its left has disengaged from the right of the second, when the chief of the first rank moves it forward; the fourth rank continues to oblique to the left until uncovered, when its chief moves it forward. At the command *Halt*, all the ranks halt on the line occupied by the first rank.

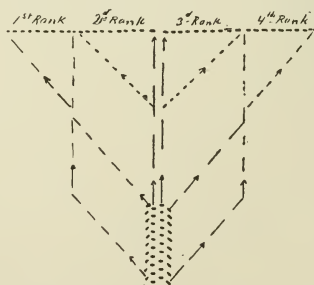
Being in *normal line* to deploy forward, spreading to the right only, the first rank moves straight forward, all the others oblique to the right, each moving forward when disengaged. The deployment spreading to the left is similarly performed by the left oblique.

The *normal line* deploys by the right or left flank, or by both flanks. When deploying by the right flank, the first rank stands fast, the others face to the right and successively uncover. The deployment by the left flank is similarly executed, the first rank standing fast. To deploy by both flanks the first and second ranks face to the right, the third and fourth ranks face to the left and similarly uncover.

The assembly is made on a designated rank, all the others moving toward it and taking their places in *normal line*. The individual man being the unit, it is a matter of no consequence that in reassembling the former right of a line has become its left, or the reverse.

Plate III.

Column of Route, deploying forward spreading from the centre, that is : right and left oblique.

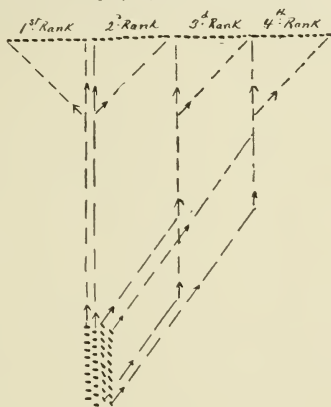


Being in *column of route* the company deploys forward, spreading from the centre. The two centre ranks move straightforward, the rank on the right obliques company distance to the right, the rank on the left obliques company distance to the left. The two

right-hand ranks execute *right front into line* ; the two left-hand ranks execute *left front into line*.

Plate IV.

Column of Route, deploying forward spreading to the right.



If it be desired to deploy to the right and not from the centre, the two left-hand ranks move straight forward ; the two right-hand ranks oblique to the right, each moving forward when company distance from the rank next on its left ; the left-hand rank executes *left front into line* ; all the others *right front into line*. The deployment to the left is similarly executed ; the two ranks on the right moving straight forward, the left-hand ranks obliquing to the left ; the right-hand rank executes *right front into line*, all the others *left front into line*.

A *column of route* deploys on the ground it occupies by similar means by the right or left, or by both flanks.

The four ranks being deployed, "*the rush*" is executed by alternate ranks. At the command the first and the third ranks rush forward about twenty-five yards, throw themselves flat, if necessary, for cover, and open fire ; the second and fourth then make a rush for about fifty yards, thus gaining twenty-five yards in advance of the first and third, which, in their turn, make the rush for fifty yards.

The line may be similarly retired, the several ranks protecting each other by their fire.

EMPLOYMENT OF RANKS.

These movements are to be practiced on the most diversified and roughest ground attainable and require that the officers

shall be able to appreciate and improve the accidents of ground for illustrating the object of any movement ordered.

To this end entirely new ground and a definite position supposed to be defended by an opposing force should be sought for attack, while officers and men are required to develop fertility of resource in assimilating their surroundings to what is likely to be experienced in actual service.

The essential object to be attained is to impress upon the soldier a sense of his personal responsibility and to encourage freedom of action. The tendency of all prescribed formations is to deprive the soldier of many opportunities for individual action by the oppressive idea that he must preserve a rigidly fixed order of sequence relatively to other men. It is to combat this idea and to habituate the soldier to what invariably takes place in war, which destroys the cohesion of units based upon serial numbers, that the men in this system are purposely *not numbered*.

The individual man is to have no rigidly fixed position in the ranks when *acting as a skirmisher*, and the chief of a rank when moving it to the assistance of a deployed firing-line, is not to confine it to marching in theatrical "single file," or to an attempt at a straight line. On the contrary, the chief may entirely break up such formations and perform his allotted task by the simplest means such as men naturally adopt when endeavoring to reach a given point under fire.

Any one rank is practically a group of comrades, and in advancing to the assistance of a deployed firing-line the men may rush into a ravine or other shelter and from that to another more advanced; making no attempt whatever at relative order of sequence in the rank, as no fixed order is intended.

The chief of a rank will practice his men in rapidly distributing themselves at customary distances in line, after grouping in some temporary shelter.

In the employment of ranks the captain detaches one rank, or two, or three, as he deems best, or as he may be directed.

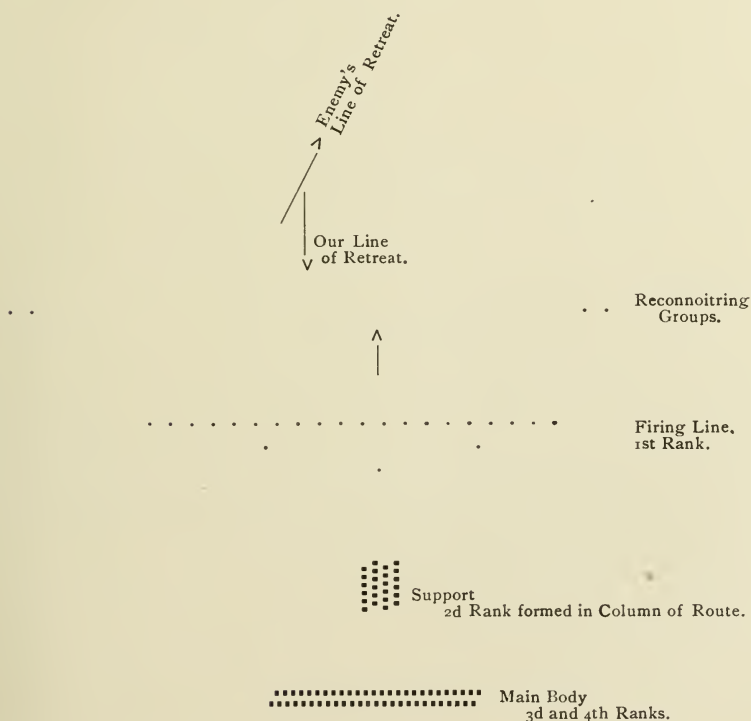
The captain frequently instructs his company as if it were an isolated command. That is he forms his first line which is composed of the firing-line, supports and main body; and the second line which is the reserve.

He also gives the first platoon to the senior lieutenant to handle precisely as he would a full company, and the second platoon to the second lieutenant to be similarly used. The two

platoons are to act as opposing forces, which enables each to judge of the efficiency of means adopted by their opponents. It is only frequent practice in the field which can teach the infantry officer to be prepared for the rough school of war.

The following gives an idea of the handling of a company as an isolated command opposed to one nearly equal or a little greater :

Plate V.



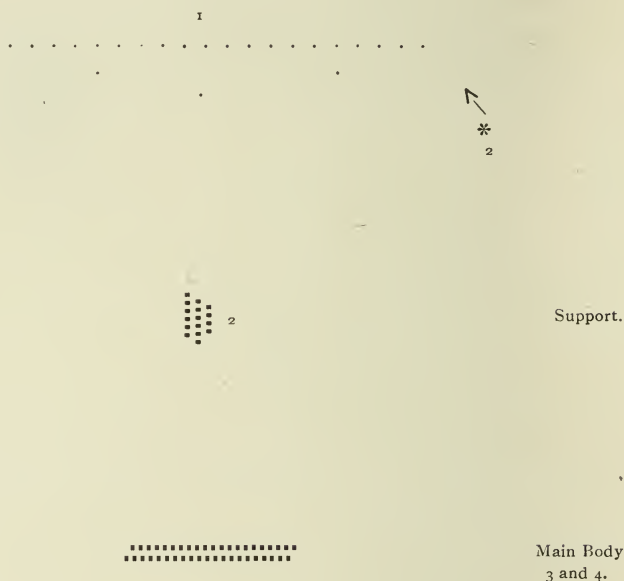
The first rank under the first lieutenant moves forward as the firing-line, the chief causing it to extend intervals if necessary.

The chief of the second rank forms it into *column of route*, thus constituting a small company to be handled as such if circumstances require, its several ranks being commanded by its own sergeants and corporals. With this as *the support*, the chief marches it in normal line, or in column of route, or in separate groups at about 150 yards in rear of the firing-line.

Coming under supposed fire, casualties occur in the firing-

line, men designated by name fall out and the others gravitate toward the centre.

Plate VI.



The chief of *the support* at a signal from the chief of the firing-line sends forward his first rank under the sergeant to reinforce the firing-line; the sergeant causes his men to rush into shelter forward; from that to another point; and finally joins the firing-line on its flank. As necessity arises the support sends forward its second rank to the flank most in need.

Plate VII.



The support meantime takes every advantage of cover while endeavoring to get nearer and nearer to the firing-line, and the chief endeavors to throw his remaining two ranks around the flanks of the supposed opposing line.

The captain disposes of his reserved ranks as he judges best, keeping them during the first period of the approach about 200 yards from the support.

As the firing-line becomes heavily engaged the captain endeavors to bring up his reserved ranks nearer and nearer.

Plate VIII.



At the opportune moment the captain detaches one of his reserved ranks to work rapidly around the flank and orders the final assault, retaining the last rank as a last reserve with which he personally pushes on to the position.

The assembly is then sounded and the company is reformed in *column of route* with the utmost rapidity and prepared for orderly manœuvre. The captain stations himself to indicate the head of the first rank, the men close up taking the nearest vacant place in any one rank regardless of former positions. For the temporary and rapid formation it is a matter of no moment that any one rank for the time being shall have a few more or a few less men than another rank. The essential object is rapid concentration to resume control and order.

Great latitude is given to the captain for the choice of methods in which to handle his company. Judgment founded upon experience is to be his guide. No set rules are allowed to interfere. The uses to which the several ranks may be put and the formations to be adopted are limited only by the captain's views of the necessities in each case.

BATTALION FIELD DRILL.

A battalion should never be so dispersed that it cannot promptly obey its own commander.

Were the battalion to deploy the four ranks of each of its four companies, there would be a lateral extension of over 750 yards to be directed and controlled by the voice of one man. All experience has shown this to be impossible in the tumult of a fight.

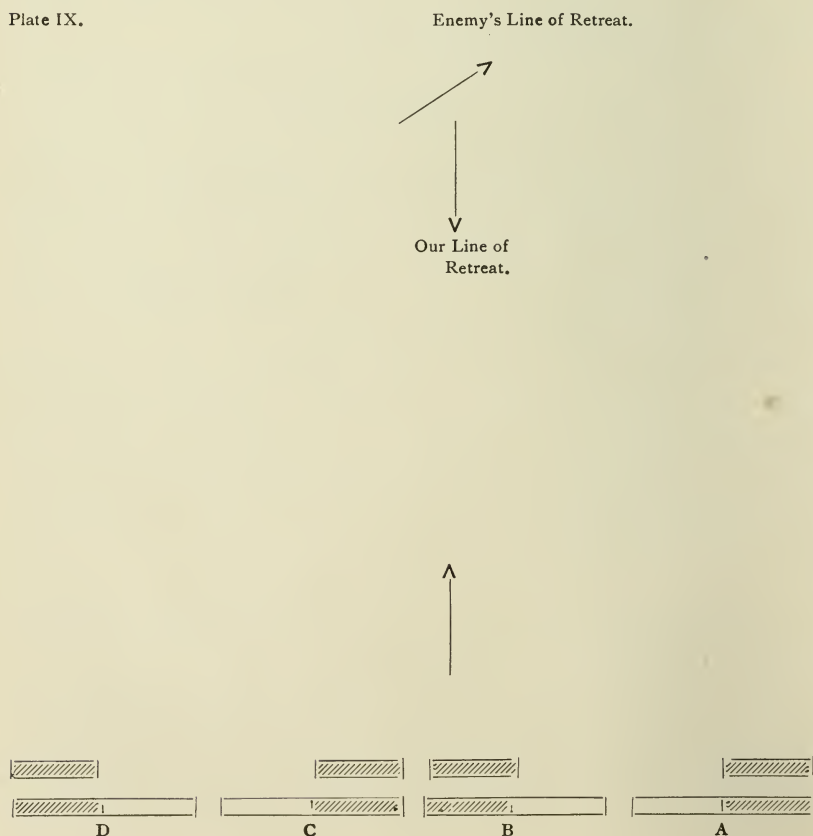
From 100 to 250 yards are taken as the extent of front that ought to be assigned to a battalion of four companies according as it is to form its own firing-line, supports, main body and reserve, or to depend upon another battalion as the reserve. This can be done giving to each company commander the opportunity to manage his own company, to support his own firing-line and to establish it in its entirety several successive times, before being compelled to call upon another company to fill the gaps on his flanks caused by casualties.

It would take too much time and space to describe the different deployments of the battalion as skirmishers.

They are made from line or column, but the cases must be exceptional where an entire battalion is deployed.

The rule is that the battalion commander forms his own firing-line, supports and main body, and if he have an isolated command

Plate IX.



he also forms his reserve. He is necessarily controlled by circumstances and he cannot be governed by explicit directions.

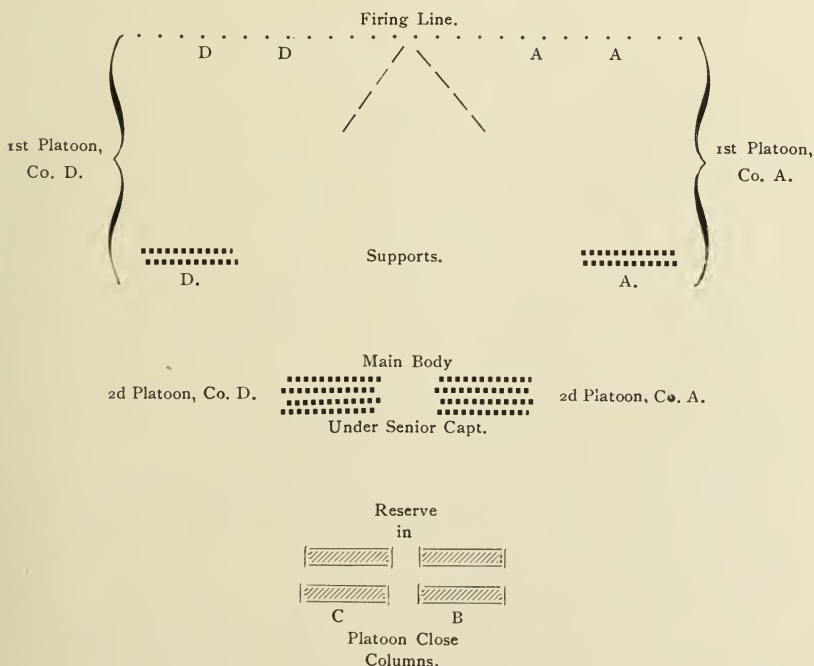
The several means of deployment and the use of companies are described more as suggestions than as guides.

The following example is given in illustration :

The battalion is an isolated command in line and it is determined to attack a certain position. (Plate IX.)

The battalion forms platoon-close-columns, the rear platoon of each company being close to its leading platoon. The line advances in this formation ; the two centre columns are near each other, the two flank columns are each out some distance.

Plate X.



At the proper time the battalion halts ; the two centre columns stand fast ; the companies on the flanks advance for 150 or 200 yards, the senior captain in command ; by his command each rear platoon of these two companies halts, the leading platoons continuing the advance. These having reached a position 150 yards in advance, the third and fourth ranks of each are halted, the first and second ranks are moved forward and deployed 150 yards in front.

Thus the firing-line, supports, main body under senior captain, and reserve under the battalion commander are in position and the *forward* is sounded.

As the firing-line becomes heavily engaged it is reinforced on its flanks by the supports.

A success on the right which is pushed home aided by the approach of the right platoon of the main body is offset by an attempt at an overlapping movement by the enemy on the left.

Plate XI.



All of the left platoon of the main body is hurried to the left to resist this movement, and one platoon of the reserve is sent for the same purpose.

The right company of the reserve has sent its first platoon forward to reinforce the centre of the firing-line; the remainder of the reserve is still held well in hand.

Seeing the enemy foiled on the left this remainder of the reserve moves rapidly upon the centre without deploying, and the whole line is carried.

The assembly is sounded.

Each captain stations himself to indicate the point where his company will assemble and the men form rapidly in column of route.

THE FIRINGS.

The foundation of fire discipline is instant obedience to the command *Cease firing*. As it is the most difficult end to attain in the fury of fight, so is it to be most carefully and systematically taught until it becomes an instinct. It insures controlled fire, and the pause steadies the men. At Gettysburg rifles were found on the field with ten or twelve loads in the barrels. This cannot

happen with the breech-loader, but it shows the necessity for fire discipline with any arm.

The most noticeable fault is failing to lower or raise the rear sight, as the range changes. Many of the English rifles that were picked up on Majuba Hill were found, at the last moment when the Boers were closing, sighted to 800 yards. This, being due to excitement and desire to increase the rapidity of fire, is best counteracted by enforced pauses in the fire.

The practice of uncontrolled fire, that is when each man judges for himself as to range and choice of objective and time for firing, should not be allowed even at drill; for once begun in actual fight it degenerates into a wild fusilade which stops only for want of ammunition, and meantime neither trumpet, or whistle or word of command would be heard in trying to effect a desirable movement, such as passing from the defensive to the offensive.

Controlled fire is that in which each man fires the number of cartridges ordered, at a designated objective, and with the elevation of sight directed by the officer in command. The control rests primarily with the chief of the firing-line and through him upon the officers and non-commissioned officers employed on this line. The chief selects the objective upon which to concentrate the fire, determines whether that fire shall be by file or by volley from each rank and names the distance and number of cartridges to be used.

The chiefs of the several ranks and their non-commissioned officers enforce obedience and see that the fire is not diverted from the objective selected.

After the command *Cease firing*, the pieces are not loaded unless the command to load is added.

With discipline, volley-firing becomes possible and is especially useful with infantry selected to assist artillery fire in preparing the way for the advance.

The *School of the Regiment* corresponds to our present Evolution of the Brigade.

The *Field Drill of the Regiment* merely applies to three battalions, the principles which govern one battalion.

CONCLUSION.

The foregoing is only a rough outline of some of the essential features in which the drill proposed differs from the present infantry tactics.

It is, of course, impossible to devise a plan which will meet every requirement and answer every objection, but it is claimed that this system will meet many of the requirements of modern war for the infantry arm, such as can be deduced from careful study of acknowledged best writers upon this most important and growing subject.

Large companies on the Prussian plan make company columns a necessity. The increasing power and accuracy of artillery fire, the perfecting of machine guns and the effect of magazine rifles make the company columns matter for debate which will not close until the next great war.

Meantime it is necessary to make our own small companies as efficient as possible, and the first step is well taken in our greater proportion of officers which foreign services cannot afford.

The death of General Upton was a national calamity. With the prestige of his name and with his mastery of the subject, we would have had to-day a system the wisdom of which all would acknowledge. General assent would have been a powerful element of success. Without his guiding hand we are groping somewhat in the dark.

In the prosecution of the work herein outlined there have been located many shoals and dangerous reefs, and in seeking to avoid these there have been disastrous discoveries on the other quarter. After repairing damages it may be that it is not all plain sailing in the course laid out.

Each officer should read all he can get hold of on this subject, to enable him properly to form an opinion. Then, in any contemplated work, it is earnestly hoped that among the well-considered efforts of so many who have written on infantry instruction these suggestions may be found of some assistance.

THE DEVELOPMENT OF SUBMARINE MINES AND TORPEDOES.

BY FIRST LIEUT. JAMES C. BUSH, U. S. A.,

FIFTH ARTILLERY.

(Continued from Journal No. 43.)

V.

THE change from many small guns to few large ones, in coast defense, has vastly increased the importance of making every shot tell. For this reason the subject of range-finding has received much study of late years, and many devices have been presented for trial.

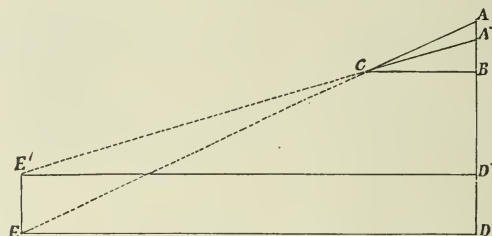
The demands of the submarine defense are equally exacting in this particular, especially in those countries where dependence is placed upon enormous charges fired by observation. When mines are fired by the observation of *one* operator, they must either be moored between marking buoys and exploded when a vessel is seen to lie between them, or the observer must be at such an altitude above water-level that the instrument employed will indicate correctly the relative position of ship and mine. Such an instrument is said to be worked by depression, and this method would be simple enough were it not for the adjustments rendered necessary by alterations in tidal level.

One of the first instruments employed for this purpose, designed by Major Watkins, R. A., was a development of his well-known depression range-finder. Later Major Watkins invented an excellent instrument of comparatively simple construction, which has been adopted in the English Service.

The theoretical considerations underlying the construction of all depression instruments that possess a correction for alterations in tidal level, is shown on the figure.

Where AC represents the telescopes collimation, BC the horizontal scale employed, DE the water surface, AB the scaled height of telescope, AD its actual height above water-level. If the latter be altered to D' from a tidal rise, or AD decreased to AD' , then, in order to obtain a tidal correction in the instru-

ment, AB must be proportionally decreased to $A'B$, and if A' and E' be joined, they will still pass through C , the length CB still indicating the distance of the mine E from the vertical AD .



The inherent defect of all depression instruments, whether for finding range or for plotting the positions of objects on a chart, consists in the difficulty encountered in finding visually the water line of the object observed.

At night it is especially difficult to see the water line of a black hull moving through water that also appears black, and if the vessel move fast, the bow wave and wave of depression behind, make it almost impossible to discover the true level of the water line.

"It has been proposed to employ depression instruments with a command of about 60 feet. With such a command, an error of one vertical yard in taking observation causes an error in range of 45 yards at 1000 yards, if the error be downwards, and of 52 yards if it be upwards.

"As large mines cannot conveniently give more than 30 feet radius to the circle of observation, or 'strike,' it appears that depression instruments, however perfect in themselves, should not be employed when the command does not exceed 60 feet." (Bucknill.)

Assuming that the instrument must be effective at night, and taking into consideration the fact that the observed vessels will probably be enveloped in smoke; that their water lines will be frequently invisible, and will often have to be guessed at from short glimpses at the remainder of the hull, Bucknill concludes that depression instruments do not possess sufficient accuracy for firing mines singly during the smoke of an engagement.

It is, perhaps, well to explain that Colonel Bucknill advocates, to a greater extent than most authorities, the use of observation mines fired by judgment, and that he insists on planting his mines in groups or lines radiating from one of the triangulation

stations even to distances ranging from one to seven miles. There is high authority for believing that such precision in planting, for mines with a "strike" of only 38 feet, is unattainable, especially in deep water.

Adepts in England do not as a rule appear to share Colonel Bucknill's opinion in regard to depression systems, and for several years firing by double observation has received but little attention. Where extreme accuracy is demanded, there can be no doubt that the method of double observations is the correct one, and in low sites no other means than horizontal angles with a long base, or a very delicate and costly instrument with a short base, is practicable.

The objection to firing by cross-intersection consists in the liability of the two men to observe different ships or different parts of the same ship. But the employment of the electric search light facilitates matters very considerably, a rule being followed that the two observers should sight on that vessel which is illuminated by the ray and stick to her as long as the light remains; also that the centre of the foremast should be the point of observation—the mast of a vessel being seldom obscured by smoke. The simplest outfit for this purpose consists of a pair of good theodolites, with proper electrical apparatus, and an accurate map divided into squares of about 50 feet on the edge.

Should the electrical position finder, invented by Lieut. B. A. Fiske, U. S. N., fulfill all its promises, the problem will be practically solved for submarine mines—though present indications seem to point towards an error considerably greater than 30 feet at 2000 yards.

VI.

"As to the utility of the electric light in channel defense, a better idea can be formed after it has been more fully tried in war. Before firing begins it will doubtless be very useful, but as soon as the air becomes obscured by smoke from the guns or from smoked balls burned for the purpose, experience leads to a doubt as to its value. It will be most useful in clear dark nights; in bright moonlight, and especially in fogs, little dependence can be placed upon its assistance." (Abbot.)

Some English experiments seem to show that in the smoke of a night engagement the light is reflected back, throwing out the fort and guns in relief.

The usual disposition of the apparatus in a fortress is to place

the engines and dynamos in bomb-proof casemates and to throw the beam from stations near the water-level, either directly or by reflectors, according to circumstances. Stations should be duplicated and placed near the flanks of the position, to avoid smoke driven by the wind.

Obstructions: Just as mines themselves form a grand obstruction to the passage of large vessels and thereby assist greatly in the defense, so smaller obstructions can be usefully employed in resisting attacks upon the mines. Nets to foul propellers are too well known for discussion.

"As a defense against attempts to grapple the cables, whether made by drifting rafts or by ordinary steam-launches, or small boats, a few hawsers anchored in front of and among the mines will certainly be found useful. They should be attached to the heavy anchors or blocks of stone used to hold them in position, by short lashings, to prevent them from being drawn under the mud."

"Multiple cables for mines soon bury themselves by their own weight in the soft bottom of many of our harbors; and as a harmless hawser can only be detached by raising it, the enemy must either lose time in so doing, or if use be made of explosive grapnels, he will be led to overestimate the damage he is inflicting."

VII.

Nothing has caused greater diversity of opinion in naval circles in all parts of the world than the subject of Torpedo Boats. Their rapid development is almost phenomenal in the history of a particular industry, especially one which has only been in operation for some fifteen years.

Sleeman divides these boats into four classes: Hunters, Division, Harbor and Ship boats. The first, as its name implies, is a special form of vessel created for hunting and destroying hostile torpedo boats. When its armament consists of quick-firing and machine-guns only, it can hardly be called a torpedo boat; generally, however, it has a torpedo, and in any case is a function of torpedo warfare.

The "Division," or sea-going class, includes those which, by their size, are capable of acting independently at sea, a certain number being attached to each division of a fleet—hence the name. It becomes difficult to draw the line between these and the Hunters, when the latter have the combined armament.

They range from 135 feet in length and 100 tons displacement upwards, but naval opinion seems to point towards relegating the larger boats to the work of coast defense.

A "Division" torpedo boat built recently by Messrs. Yarrow & Co., England, had the following dimensions:

Length over all.....	135 ft.
Beam at water line	14 ft.
Depth	9 ft. 2in.
Displacement (loaded).....	130 tons.
Speed	23 knots.
Coal endurance at 10 knots	4000 knots.

Turning circles, going ahead to port 90 yards in diameter in 60 seconds, to starboard 110 yards in 65 seconds. The hull is subdivided by bulkheads into eleven water-tight compartments. Two torpedo tubes for delivering a beam fire are placed aft, while a third tube is built into the stem forward for end on fire. The gun armament consists of five quick-firing 3-pdr. guns.

Boats of the Harbor class are intended for harbor defense only, and include all those too large to be carried in ships and too small to effectively fulfill the duties of division boats.

They are provided with electric search lights, torpedo tubes, and machine-guns.

It is generally conceded that the submarine mine defense should be supplemented by these boats. This is recognized in our own country, as shown by the recommendations of the Coast Defense Board, who include torpedo boats as necessary adjuncts to all proper harbor defense. Indeed, a port with the peculiar features of San Francisco can hardly be defended by other means than guns, torpedo tubes, locomotive torpedoes, and torpedo boats.

The Ship class include the largest sized boats that can be conveniently carried on ship-board.

The qualifications of each class are very similar, differing mainly in degree, and are as follows: Speed, with due regard to durability of engines and boilers; handiness in manœuvring; coal endurance; sea-worthiness; proper size, including habitability and suitability; suitable armament of torpedoes and guns; proper protection for engines, crew, etc.

The factor of speed forms, of course, one of the most important essentials, but the question is being seriously debated in naval circles whether too much importance has not been and is

not now being attached to this factor, to the possible detriment of some other equally important one, such as durability, for instance.

In the English race of 1887, when 22 of these craft competed over a 100 mile course, seven were placed *hors de combat* through machinery accidents and one by loss of a propeller blade.

All require the most perfect development of the property of handiness, *i. e.*, the power of rapidly answering the helm.

The actual vulnerability of any torpedo boat has never yet been determined, as this factor applies not only to the vessel but also to its torpedo equipment, its officers and crew, particularly to the commander and engineer.

The armament may consist of both torpedoes and quick-firing or machine-guns; all are, however, provided with the former, which are of greatest importance as the effectiveness of the torpedo is the actual measure of the power of the torpedo boat.

“It is now possible to obtain a torpedo boat having a speed of from 25 to 28 knots per hour, a coal endurance represented by a run of 5000 knots at the rate of 10 knots per hour, and capable of turning at full speed a complete circle of a diameter twice the boat's length in about a minute. Her mode of attack, however, is of such a nature (Whitehead torpedo) that she must be brought to within 500 yards of a hostile ship to enable her to deliver a blow with even a hope of success. Now, in these days of quick-firing and machine-guns and electric lights, her chances of coming out of action unharmed will be very few, while the chances of her being severely damaged will be very great, and her destruction even possible, before she has fired her torpedo.

“It would seem a matter for serious consideration to seek for some form of torpedo which shall give to the almost perfect torpedo boat of the present day a power of aggressive action more capable than the present weapon of bringing all the excellent qualities of this vessel into play, and at the same time without obliging her, whilst delivering the attack, to become dangerously exposed to the enemy's fires.” (Sleeman.)

VIII.

The idea of a submarine or submersible boat for war purposes has been before the world for over 200 years. During this long period almost every conceivable method of submersion and propulsion has been proposed or actually tried, but until a very

recent date the history of this boat has been one of failure and disaster.

In our Civil War a submarine boat was certainly effectual in sinking a ship—in which operation she was also lost.

In England the *Nordenfelt* has been successfully operated, while Russia possesses a number of *Goubets*, France has the *Gymnote*, Spain the *Peral*, and in our country we have the *Tuck* and *Holland*.

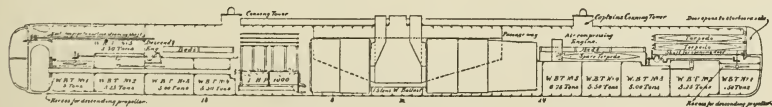
An electric motor supplied from storage batteries furnishes the propelling power of the *Goubet* which is of the sinking type, the submergence being caused by water admitted to reservoirs. The boat is small, only thirty-three feet in length, and has a speed of five knots. It carries a small torpedo which when released rises to the surface and explodes by electricity.

The *Gymnote* belongs to the diving class. It accomplishes this diving after the manner of the Whitehead torpedo, by means of horizontal rudders worked by hydrostatic pressure or at will. The power is electricity. Armament not determined.

Little is known of the Spanish electric boat *Peral*. The estimated speed at surface is 11 knots, and $10\frac{1}{2}$ knots submerged.

The *Holland* (diving-type) has a petroleum engine, air-compressing machinery and a 10-inch pneumatic torpedo tube with a range of 1000 yards over water and 200 yards under. Speed 9 knots.

The *Tuck* electric boat has a combined action. A horizontal rudder at the stern causes her to dive when in motion while a propeller acting vertically draws the boat beneath the surface. Water admitted into compartments provided for the purpose also causes her to sink. All these have a very similar shape approximating that of the cigar.



NORDENFELT SUBMARINE TORPEDO BOAT.

The *Nordenfelt* boats (combined type) have demonstrated their efficiency and safety most conclusively in official trials, their capability and utility for naval warfare remain to be proved. They have steam propulsion, the usual propeller astern, and a horizontal propeller at each end for giving submersion. The machinery consists of a pair of double-cylinder vertical com-

pound engines, 1000 H. P., which propel her 15 knots per hour at the surface and 5 knots below water. Two steel conning towers surmounted by glass domes stand about two feet above deck and supply a means of look-out when the boat is sealed up.

The last one built has a length of 125 feet, 12 feet beam, a circular midship section and wedged-shaped ends. Two Whitehead discharging tubes placed in the bow supply her armament. When the boat is a-wash, brought about by filling water-tanks, she floats with only the conning towers in sight. She has never less than half a ton reserve buoyancy, with 50 feet submergence. The crew consists of a captain and eight men.

"The property of being propelled when wholly submerged, though a distinctive and important feature of submersible boats, has been commonly and erroneously treated as the sole object of their construction, instead of merely a means to an end." "The value of the submarine boat would be greatly enhanced as a torpedo boat, by possessing the power of running at full speed while partially submerged. It is now generally accepted that the condition of total submersion should only be resorted to under certain special circumstances such as defending itself against the attack of surface boats."

If driven beyond a speed of five knots, while submerged in deep water, there is much risk of the vessel being caused to dive to a depth beyond the strength of the hull to resist, before the corrective forces could direct her upward; and owing to the comparatively small amount of reserve buoyancy there is danger that the boat may be compressed so much as to seriously reduce its displacement.

In shallow water she runs the risk of being driven on the bottom and held there. A further danger attending full speed when submerged, results from the impossibility of discerning objects right ahead.

"It would seem, therefore, worthy the attention of naval architects to devise a torpedo boat capable of running at its highest speed whether on the surface or *partially* submerged, and give up the idea of total submergence." (Sleeman.)

IX.

The spar or outrigger torpedo is the simplest form of submarine offensive weapon extant, and as a manned boat or ship carries it to the point of attack, it must be considered as pos-

sessing the feature of controlability in the most absolute manner.

It has, however, one insuperable defect, lack of range, and in these days of quick firing guns a ship can repulse the attack if prepared to meet it.

This torpedo came prominently into notice during our Civil War, when the power of ship defense was relatively very much smaller than the comparative capabilities for attack then and now. Since that war the power of ship defense has developed far more rapidly than the means of attack by the spar, thus causing a demand for a submarine weapon possessing the power of delivering its blow at a distance from the operating point. This is the only offensive weapon which has stood the test of actual service with much show of success, the exploits of Cushing and Davidson in America, of Dubasoff and Shestakoff on the Danube, having clearly proved its worth under the conditions then existing.

On account of its lack of range the spar would in all probability have been expunged from the list of naval weapons but for the successful issue of its employment by the French in Chinese waters in 1884.

"These French successes unquestionably show that under certain conditions this weapon will prove most effective, as for instance, in the attack of a ship at anchor unprovided with any kind of external protection and where by the absence of proper look-out the torpedo boat can get close up before being observed.

"For clearing away booms and other obstructions placed across a harbor or river mouth the spar will find useful applications, and it has the merit of cheapness, simplicity and ready adaptation to any ordinary service boat."

The introduction of the higher explosives in place of gunpowder, the use of steel instead of wooden spars, the adaptation of electrical ignition in place of mechanical, and the development of the fast steam torpedo boat have together combined to greatly enhance the value of the spar torpedo as a weapon of offense in the present day.

X.

At the present time there are before the world a multitude of inventions of different kinds of torpedoes, all coming under the category of controllable or uncontrollable varieties. A few have received regular adoption, some have failed to realize the expect-

tations of their originators under the crucial test of official trial, and others are but just emerging from the difficulties inherent to the realization of a theoretical conception in actual practice.

The employment of these torpedoes in batteries, specially constructed for them, has often been recommended for the defense of narrow channels, entrances to harbors, etc., and this method has been adopted by some nations in certain favorable situations.

The Whitehead (uncontrollable type) forms part of the armament of so many nations and has received so much attention for a long period of years that it has probably been brought to the highest state of efficiency obtainable.

The Swartzkoff-Whitehead, the outcome of the purchase of the "secret" by the German government, differs from the true Whitehead mainly in the material of construction, the latter being of steel while the Swartzkoff is of "phosphor-bronze." The case has a length of $14\frac{1}{2}$ feet, a circular cross section of 14 inches diameter, and pointed ends. It weighs about 600 pounds, carries about 70 pounds of explosive, and has a speed of 27 knots for a range of 400 yards. It is propelled by two screws one abaft the other, working in opposite directions and driven by a Brotherhood three-cylinder engine and a reservoir of highly compressed air. A regulating valve causes the engine to be driven at any desired speed.

The charge is carried near the head, which has an exploding apparatus, brought into play when the torpedo strikes the side of a vessel. The immersion is regulated by horizontal rudders at the tail, actuated by compressed air and governed by a valve itself controlled by hydrostatic pressure due to immersion. Vertical fins regulate lateral direction by permanent adjustments made in accordance with experiment.

The Whitehead is ejected by compressed air or by the explosion of a small charge of gunpowder (Canet system); the directing tubes, carriages, or other apparatus varying according to the conditions of each situation, such as under-water or over-water discharge and front or broadside discharge.

They can also be discharged by gravity, like the ball of a falling pendulum, release being effected at or near the lowest point of the fall, or by running down an inclined parabolic surface. "This last method appears to be specially favorable for employment in shore batteries."

The below-water discharge has the advantage of affording protection to the men as well as to the weapon itself, while the torpedo is less deflected on entering the water, but it has the disadvantage of not permitting the training of the launching tube, the direction being given by the helm of the vessel.

Above-water discharge labors under the defect of being liable to disablement, or to the premature explosion of the torpedo, by the enemy's fire; and on account of the variability of the height above water, caused by the rolling and pitching of the ship or boat, the direction of the torpedo becomes uncertain after entering the water.

The defects of this weapon are:

Inefficiency due to the small charge carried, uncertainty as to accuracy—for, although a vessel can generally be hit at 300 yards range this cannot be depended upon; expense—they cost over \$2500 apiece; intricacy due to the quantity of highly finished and complicated machinery; difficulties in manipulation—requiring great intelligence on the part of the personnel combined with long and careful training.

It requires constant care and attention to keep the mechanism clean and efficient—though this has been overcome in the Swartzkoff. The phosphor-bronze renders it possible to keep the weapon in perfect efficiency for many weeks without taking it apart for cleaning or readjusting the various delicate mechanisms.

The uncontrollable torpedo invented by Captain Howell, U. S. Navy, has a general design and outward appearance very similar to the Whitehead. The most important novelty is the motor, which consists of a ponderous gyroscope on a horizontal axis across the centre of the case.

A torpedo 8 feet long, 13.3 inches in diameter, carries 70 lbs. of explosive and a fly-wheel of 110 lbs., the whole weighing 325 lbs. The fly-wheel is spun up to 10,000 revolutions per minute, which results in half a million foot pounds being stored in the motor.

"The fundamental principle upon which the steering of this torpedo is based, is, that if a revolving fly-wheel be acted upon by any force which tends to turn it about an axis not parallel to its own, there will be a resultant motion about an axis perpendicular to the plane of these two. This offsets and opposes lateral deflection of the torpedo, and compels it to travel in the course in which it was originally pointed or launched."

“The axis of the fly-wheel being horizontal, any extraneous force tending to deflect it laterally will cause the torpedo to roll, which rolling can be conveniently employed to bring into action steering mechanism arranged to apply automatically an opposite deviating force.” A regulator governed by the pressure of the water automatically controls the diving.

Most of the defects enumerated for the Whitehead have been overcome in the “Howell,” which has the advantage of inherent directive force, heavier charge in proportion to total weight, smaller size, simpler mechanism and less cost.

If used for harbor defense, these torpedoes could be placed in shore batteries or mounted on some floating body and moored under the shelter of the land or a fort in a convenient place for aiding the defense.

By such means a foe would be kept in ignorance of the position from which his vessels might be torpedoed should he attempt to force a passage.

In accuracy of flight the uncontrolled torpedo compares very unfavorably with a projectile fired from a gun; the former lacks the speed and rotation of the latter and is besides subject to far more serious causes of inaccuracy, due in large measure to the greater density of the medium through which the torpedo must pass.

XI.

For many years it has been seen that a successful controllable torpedo would find useful employment in certain situations for harbor or river defense, and its more sanguine admirers believed that it might become an important naval weapon, but at present the best-known forms seem to find no favor in our own or other navies.

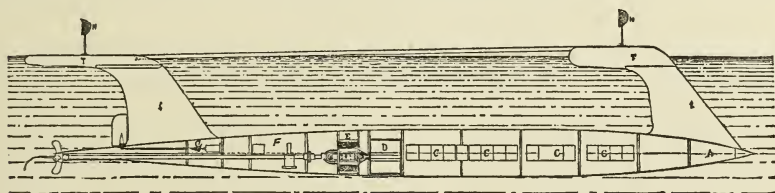
The Lay, the Sims-Edison, the Nordenfelt, the Patrick, the Lay-Patrick and the Brennan have received most attention. The Lay and Patrick are propelled by compressed carbonic acid gas, the Sims-Edison by electricity generated at the base of operations, the Nordenfelt by electricity carried in the torpedo, and the Brennan (locomotive type) by a powerful winding engine stationed on shore.

The rapid unwinding of two wires from two drums or reels carried in the interior of the Brennan torpedo, each drum connected to one of two propeller shafts, causes the propellers to revolve at a high rate of speed and consequently forces the tor-

pedo through the water by the difference between the retarding strain on the wires and the forward thrust due to propeller action; considerable interest has been shown regarding this invention because of the apparent paradox involved in this mode of propulsion—namely, that the harder it is pulled back the faster it goes ahead.

The varying tension of the two wires is utilized for given lateral direction, while two automatic bow rudders, actuated by hydrostatic pressure, govern the immersion.

Phosphorus or Home's light mixture, each emits flame and smoke in the track of the torpedo when brought in contact with water, is carried in a small receptacle near the head of the torpedo and utilized for observing the course. It has a range of 3000 yards, a speed of 20 miles per hour, a length of 25 feet, pointed ends and carries about 200 pounds explosive.



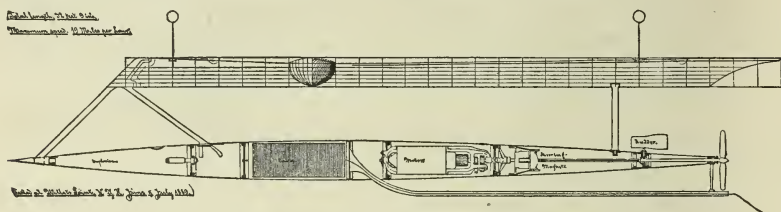
NORDENFELT ELECTRICAL TORPEDO.

The Nordenfelt (auto-mobile) has a form similar to the Brennan but, being buoyant, obtains its immersion by means of weighted fins of special form which permit the torpedo to charge under booms and such like obstructions.

The Nordenfelt possesses peculiar interest by reason of its mode of propulsion—electrical power developed within the torpedo itself. This alone constitutes a marked difference between it and all others of this type, and is the outcome of the development of electrical accumulators or secondary batteries in connection with the propulsion of boats. It carries about 300 lbs. of explosive, is steered by electricity and has a speed of sixteen knots for a 2-mile range.

The Patrick, also "self-moving" (carbonic acid gas-engine) and controlled by electricity, obtains its submergence (about 4 feet) by means of a fusiform float which supports the torpedo, also fusiform. The "Patrick" is a development of the Lay torpedo, which began to assume practical shape some sixteen years ago, and after improvement by Mr. Height became, by still

further improvement, the present "Patrick" torpedo. It has a length of 42 feet, a speed of 22 miles per hour, weighs 7300 lbs., carries 200 lbs of explosive and 8400 feet of cable.



SIMS-EDISON ELECTRICAL TORPEDO.

The Sims-Edison torpedo (locomotive type) consists of a hull or float filled with cotton rendered impervious to water which supports the torpedo ($3\frac{3}{4}$ feet beneath) by means of braces; the foremost one slanting upward and backward enables the weapon to dive under floating obstructions.

A dynamo on shore, worked by steam power, generates the current which drives the propelling motor in the torpedo through the medium of a cable wound within the torpedo case. This case has a circular mid-section and conical ends. The rudder is worked by two electro magnets operated by a portion of the main current. The current required to drive the new motor, recently tried, has an E. M. F. reaching in some instances 1300 volts. The torpedo itself is smaller and the float longer than the old one and better adapted to high speed.

A most severe and exhaustive series of experiments with this torpedo have been carried out under the direction of General Abbot, Eng. Corps, resulting satisfactorily, except in the matter of speed.

Later improvements in the motor and shape of the float have produced, in recent trials under Colonel King, Engineer Corps, a speed of 19 miles per hour.

The torpedo carries about 200 lbs. of explosive, weighs about $1\frac{1}{2}$ tons, has a length of about 30 feet and a little over a mile range.

"The sphere of action of the locomotive torpedo (Sims-Edison and Brennan) is limited by the length of cable carried, as it must be worked from a fixed point; and while the motive power is practically unlimited as to time, yet the actual range of action depends on the distance it can be readily observed by the operator who controls it. In the daytime this would not be further

than 3000 yards, while at night, though lights may be used, yet the distance at which the attacked ship could be seen, unlighted as she would be in war time, would limit the distance to about 1000 yards."

"The sphere of action of the auto-mobile-type, Patrick and Nordenfelt is, on the other hand, practically unlimited, as they can be worked from any point on shore or afloat, while they could also be towed out to sea under cover of darkness and attack a blockading fleet or ship from seaward. In combination with a submarine boat their effectiveness would be immensely increased and the combination would unquestionably form a most deadly and sure mode of attack." (Sleeman.)

"While it is not probable that any known form of controllable torpedo could be successfully operated in a heavy sea, it is probable that in a moderate sea-way and with waves 2 or 3 feet high, the torpedo could be guided as far as it could be followed by the eye of the operator.

"The range (1.5 miles) could be increased, but it is already about as great as could be utilized, on account of the extreme difficulty of following up the torpedo, and judging of its position with relation to the vessel it is sent after, even in smooth water. Seeing two large vessels at a mile and a half distance, and not in line with the observer, approach each other, it is very difficult to tell without instruments whether they will pass to the right or left of each other, and with nothing but two small flags visible, as is necessary in case of a controllable torpedo, the problem is even more uncertain. With an elevated point of observation this difficulty may be in a measure overcome and a longer range be practicable." (*Col. King: Report on experiments with Patrick torpedo, 1889.*)

XII.

The idea of projecting torpedoes to a distance by means of artillery is old, and a proposal to employ mortars for this purpose was brought forward officially in England some years ago, but experiments were not recommended, high angle fire from mortars being considered too inaccurate for the purpose.

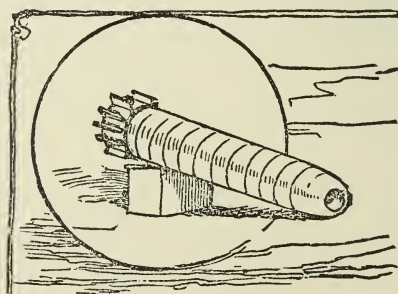
In 1883 Mr. Mefford, of Ohio, produced an air tube for throwing shells charged with high explosive. Capt. E. L. Zalinski, U. S. Artillery, took up the invention, and it has since been developed largely by him and by Mr. Merriam, whose fuse attained such marked success in a recent trial. An arm of great efficiency

and accuracy has resulted in completely vindicating the theories held by the advocates of air propulsion for aerial torpedoes.

The ballistic properties of the air tube are not sufficiently appreciated by many. In the first place, owing to the size of the air reservoir, the pressure exerted on the base of the torpedo is nearly constant throughout the entire length of the bore, and owing to the certainty with which the air pressure can be regulated, it is peculiarly well adapted for discharging torpedoes filled with detonating compounds. Again the accurate manner with which range can be altered by altering pressure instead of elevation is an important factor in its favor.

The pneumatic torpedo projector is too well known to require detailed description, and consists mainly of a light tube with suitable support and a breech mechanism containing a balanced valve so arranged as to open and close by a single movement of the operator. The time of opening and closing can be varied by an adjusting device so that any desired loss of pressure will ensue. In this way the range can be changed without change of elevation. Two reservoirs supply compressed air; one a "storage reservoir," receives the air from the compressor, and the other the "firing reservoir" supplies it directly to the tube. The latter has a capacity about five times that of the tube.

The full calibre shell is retained in its proper trajectory by a tubular tail piece having affixed thereon spiral steel vanes, which serve to give rotation and keep the point foremost.



SUB-CALIBRE AERIAL TORPEDO.

The sub-calibre shell may have any diameter less than that of the bore; and is centred by an attached gas-check of full calibre and a centring piece attached to the body of the shell near the point. The 8" shell carries 100 pounds of explosive and the 15", 500 pounds.

The Merriam combination fuse has a delay action such that the torpedo can be exploded at the surface or at any desired number of seconds below water, or by direct contact.

The question of accuracy of fire appears to have been settled by the trial before the Naval Board in 1886, when four out of five shells landed in essentially the same spot at 1613 yards—the other went 7 yards beyond. The extreme range is 4500 yards.

Torpedo artillery as developed in the pneumatic projector compares most favorably with other methods of sending a torpedo to any given point of attack.

Compared with controlled torpedoes: It is not stopped by booms or netting. Its speed is fourteen times as great. It can discharge torpedoes at the rate of about one per minute. It has no long life artery of wires exposed to injury. Good practice can be made when the object attacked is enveloped in smoke, a mast being all sufficient to aim at. It can be used in thick weather, fog and darkness (some portion of the object being visible) much better than an arm which must be kept in sight and guided during the whole run. It can be used effectively at short ranges from a rapidly moving platform, such as a man-of-war or a torpedo boat.

In these particulars the controlled torpedo is distinctly inferior and its superiority on any other point has not been suggested. No system of the kind can compete with one that hurls large torpedoes with remarkable accuracy, and at least equal range, at the rate of nearly one per minute.

"There is but little difficulty in so locating and directing torpedo artillery that the shell shall not damage the mine defenses." (Bucknill.)

Controlled torpedoes cannot always be employed over waters mined with electro-contact and automatic arrangements which are near to the surface at low water in situations where the rise and fall of tide is great.

But submarine mines should never be replaced by torpedo artillery nor by controlled torpedoes, for however perfect these may be, they do not possess the blocking effect of hidden and unknown mines.

XIII.

"Remembering that a cleared and buoyed passage is a *sine qua non* for the attacking fleet, and that by daylight the guns of

the forts will sweep the mined zone with a murderous fire, the uncertainty of any unsystematic attack is apparent."

"The only successful method of attacking land mines has been shown, by the experience of centuries, to be by countermines, and I believe that future wars will teach the same lesson for sea mines." (Abbot.)

"The first step taken by the attack will be a heavy artillery fire, delivered against those portions of the defense within range and exposed to fire."

"This will be done by daylight. To attempt any boat attack on the mines, before the artillery defenses had been crippled as far as possible, would simply invite defeat."

"The patrol boats of the defense could not hope to offer an effective resistance in the advanced zone, except for a short time. They would retire as soon as the attacking flotilla had reached the waters within range of the quick-firing guns and await opportunities for making offensive returns."

"If old hulks, steered by electricity, be sent forward to explode the mines, or if rafts provided with grapnels (creeping operations) drift in with the tide, the mine operator would switch off his batteries, and, although injury might result, a terrible uncertainty would remain with the enemy as to how many perfect mines might still be waiting to receive him."

"Sweeping for mines" by boats in pairs, with ropes or nets between them, is a most difficult operation to carry out at night, and it would of course be impossible to perform it successfully by day under a hostile fire."

"Countermining operations, whether conducted by means of heavily armored vessels which plant the countermines and then back off and explode them by electricity, or by vessels armed with pneumatic tubes, will neither be expeditious nor safe, even when undertaken from a distance. They can hardly be successfully performed by daylight, so long as the artillery defenses remain, and considerable uncertainty would attend the operation when conducted under cover of darkness, however carefully the ship may be laid by compass bearings or by lights on shore should these exist."

"Sweeping" and "creeping" could never be undertaken by daylight, within range of the shore, so long as the defense retained the power of bringing machine-gun fire to bear upon the boats.

"By night new mines would be dropped into any channel that might have been cleared and buoyed.

"In short, the whole of the work connected with the attack on mined waters is so difficult and hazardous, that we may fairly doubt the probability of these operations being seriously undertaken until the forts and batteries have been demolished and the defense thoroughly demoralized." *

* The writer desires to make acknowledgment to the various works of General H. L. Abbot, Corps of Engineers, U. S. Army; to Colonel J. T. Bucknill, R. E., (*Submarine Mines and Torpedoes*, John Wiley & Son, No. 15 Astor Place, New York) and to Mr. C. Sleeman (*Torpedoes and Torpedo Warfare*, Griffin & Co., The Hard, Portsmouth, England).

ERRATA.

First part, on page 184 :—The remark concerning the relative density of Dynamite and Blasting Gelatine presumes dynamite to be in loose powder.

On page 186, sixth line, for relative value, read "relative values."

In Colonel Bucknill's table, 0.9 for gunpowder evidently refers to gravimetric density.

On page 189, last line, for short station read "shore station."

On page 192, last line, for action currents, read "action of currents."

THE ORGANIZATION AND USE OF ARTILLERY DURING THE WAR OF THE REBELLION.*

BY CAPTAIN H. W. HUBBELL, U. S. A.,

FIRST ARTILLERY.

IT was fortunate for the Federal Government that, at the outbreak of hostilities in 1861, its military establishment contained a large proportion of artillery regiments. The Regular Army possessed five regiments of cavalry, four of artillery, and ten of infantry, making twenty-one per cent. of the line of the Army artillery, against eleven per cent. at the present time. As regards the officers, the percentage was still greater. It is true that the artillery was employed as infantry to a greater extent before the War than at any time since, as a large number of companies were doing duty at frontier posts; still, the officers had the benefit of instruction by rotation in the two field batteries, or light companies, as they were called, in each regiment. The Artillery School for practice at Fort Monroe embraced a garrison of eight companies, which were changed from time to time, so that the officers and enlisted men, as a whole, might have been considered well qualified in the various duties of artillerymen,—field, siege and garrison. The 5th Regiment, organized in May, 1861, took its field officers, captains and senior lieutenants, together with a large number of its non-commissioned officers, from the old regiments, so that it soon became assimilated and imbued with the discipline and *esprit* of the rest of the corps. The field officers, and most of the captains of artillery, were very shortly drawn off to fill high volunteer commands and staff positions; but these, ere their departure, were able to induct into their duties the large influx of young civilians who were commissioned to fill the vacancies caused by resignation and dismissal, and who, from their youth, were generally apt pupils, and soon qualified themselves for their positions. These officers, with a fair proportion of fine material from the Military Academy and a sprinkling of officers promoted from the ranks,

* Read before the class of officers at the Artillery School, Fort Monroe, Va., in 1887.

fought our batteries from Bull Run to Appomattox, if not always with success, never, it is believed, with dishonor. At the close of the War they were rewarded by the brevets of lieutenant-colonel, bestowed upon the captains, and major upon the first lieutenants. Their more far-seeing comrades, who left them early in the fray for positions in the staff corps, were honored by a discerning Government, in many instances, with the brevet of brigadier-general, and this, although their duties had been entirely confined to the bureau and desk.

The artillery, on January 1st, 1861, was widely scattered throughout the land. There was not even the semblance of an attempt at keeping the companies of a regiment in the same region of country. The stations of the First Artillery will serve as an example. Companies A and C were at Fort Monroe, Va.; B, Key West, Fla.; G, Fort Barrancas, Fla.; D, Baton Rouge Barracks; F, L, and Light Co. K, Fort Duncan, Tex., and Light Co. I, Fort Leavenworth, Kas. The enlisted men of the artillery, like their comrades in the other corps, remained true to their colors when the States seceded. This is the more creditable when we consider the fact that many of them were aliens by birth, that they were tempted by the prospect of promotion held out to them by the Secession leaders, and by witnessing whole communities abandoning the flag under which they were born. These faithful men were invaluable in quickly moulding, by their example, the great number of recruits assigned to the batteries when they were mounted and increased from about fifty to one hundred and fifty enlisted men each. Such, then, was the personnel of the Regular Artillery during the War. It should be added, however, that depleted batteries in the field were, by authority of the War Department, filled by drafts from volunteer infantry regiments, owing to the difficulty of recruiting the Regular Army, due to the high bounties paid the volunteers. These men soon became assimilated to the discipline of the Regulars, and were not to be distinguished from them. As regards the officers and men of the volunteer artillery, they were about of the same type as existed in the other volunteer corps, no special mental or physical qualifications being observable. Our immunity from attack by sea, owing to the lack of a navy by the Confederacy, precluded any opportunities for the service of our artillery in our sea-coast forts, with one notable exception, viz.: the defense of Fort Sumter. As this was but a perfunctory resistance; a garri-

son of seventy-five men of the First Artillery pitted against thousands of the enemy, manning batteries erected on every available spot, it was of value only as illustrating one point, namely, that our sea-coast forts of that period, of which Fort Sumter was one of the most recent types, were invulnerable to the heaviest ordnance then in use.

Gen. Truman Seymour, who was captain of one of the batteries in Sumter, says: "Two thousand three hundred and sixty-one shot, and nine hundred and eighty shells had been delivered at Fort Sumter. No material injury had been done to the work, and its defensive capabilities were rather increased than diminished when the barracks had been consumed. It might have withstood, indefinitely, any amount of battering from smooth-bore guns, which only scaled off here and there a few inches in depth of the brick wall. The essential and vital weakness of Sumter was in the lack of provisions. When the work was evacuated there remained unconsumed only some six barrels of pork, and the holding of Sumter was strictly limited to the endurance of this pork which would have lasted as many days,—there was no apparent possibility of being supplied from without. The dispersed condition of the companies brought the Government in 1861 face to face with the necessity for providing itself with more field artillery, and was the immediate cause of the 5th Regiment being organized; for although when the Civil War broke out, the companies were called in as quickly as possible, in many cases it could not be done soon, and in some instances it was not known that it could be done at all. The law designated as '*batteries*' the tactical units of the regiment. This was the first time this designation had received legal sanction, although for several years the terms '*light company*' and battery had been treated as synonymous in orders from Army Headquarters. The 5th was equipped throughout as field artillery. The importance of placing on a field artillery footing every company of the old regiments that could by any manner be made available, was quickly appreciated; and for the reason stated above, that the enemy was not a maritime power, it became the easier and more reasonable thing to take for this work the companies from the sea-coast, as well as those from the interior." On August 23d, 1861, General Barry, Chief of Artillery, Army of the Potomac, addressed General McClellan, as follows:

"To ensure success, it is of vital importance that the Army

should have an overwhelming force of field artillery. To render this the more effective, the field batteries should as far as possible, consist of regular troops."

"Upon reaching Washington on July 27th, 1861, General McClellan found in the forces assembled in and around Washington, 650 artillerymen with 9 imperfect field batteries of 30 pieces and 400 horses. On November 30th, this force had been augmented to 130 heavy and 248 field pieces, and on March 31, 1862, when the whole Army took the field, it consisted of 92 batteries of 520 guns, 12,500 men, and 11,000 horses, fully equipped and in readiness for active service. Of the whole force 30 batteries were Regulars, and 62 Volunteers. General McClellan recommended that the whole of the regular artillery, old and new, be ordered to report at Washington except the mounted batteries actually serving in other departments, and the minimum number of companies actually necessary to form the nucleus of the garrison of the most important permanent works. These earnest recommendations had the effect to bring into the Army of the Potomac as field batteries half of the regular artillery of the United States. As usual with that arm, the service was by detachment, the regular batteries forming nuclei around which gathered the volunteers. This important principle of organization, conformable to the sound and settled policy on which the Regular Army has been maintained in time of Peace, was observed in every phase of organization that the artillery experienced, and whether assigned to brigades, divisions, corps or armies, and with or without reserves. Horse artillery was early recognized as the associate of properly organized cavalry. Accordingly some time in the fall of 1861, Tidball's Co. (A) of the 2d was equipped for that service at Washington, forming the first company of horse artillery in the Army since Bragg's company was dismounted at Santa Fé after the Mexican War. This was soon followed by three others, the four being formed into a horse artillery brigade, and so efficient did they prove that by the date of the battle of Chancellorsville, May, 1863, their number had been doubled. After this battle the horse batteries which now embraced a few volunteer organizations, were organized into two brigades, that they might alternate campaigning and recuperating in their arduous services with the cavalry. The strength of these brigades gradually increased in personnel and fighting power as their utility became manifest, and their management understood, until under Meade, May 4,

1864, on the eve of the Wilderness battles, the two brigades embraced 12 batteries. Seven were 6-gun, and five 4-gun batteries." These splendid organizations, each comprising about 1200 men and horses and 32 guns were commanded by captains. Associated with cavalry of other armies than that of the Potomac were horse batteries, the armament being generally three-inch rifle guns, which were served with an enterprise, *élan* and effectiveness unsurpassed up to that time by the first artilleryists of the world. Of the companies equipped for longer or shorter periods, as field batteries from the Regular Army during the Civil War, about one-third served as horse artillery.

"At the beginning of the War artillery was distributed to regiments and brigades. To those who were capable of learning, a brief experience was sufficient to demonstrate the disadvantages of the system. It sacrificed in an army of any considerable size that concentration which alone renders artillery fire formidable; therefore the brigade system broke down.

"In the re-organization by General McClellan in July 1861, the following principles formed the basis for the organization of the artillery :

"1st. The proportion of artillery should be in the ratio of at least $2\frac{1}{2}$ pieces to 1000 men, to be expanded if possible to 3 pieces.

"2d. The field guns should be restricted to the systems of the United States Ordnance Department and of Parrott, the smooth bores (with the exception of a few howitzers for special service) to be exclusively the 12-pounder guns, model of 1857, variously called the gun howitzer, light 12-pounder, or the Napoleon.

"3d. Each field battery to be composed, if practicable, of six, and none to have less than four guns, those of each battery to be of uniform calibre.

"4th. The field batteries to be assigned to divisions and not to brigades, in the proportion of four to each division, one of which should be a regular battery, the rest volunteers ; the captain of the Regulars to command the artillery of the division. In the event of several divisions being united into an army corps, at least one-half the divisional artillery to be withdrawn from the divisions and formed into a corps reserve. [NOTE.—The contingency provided for having arisen, the corps reserves were formed as contemplated when the Army was on the Peninsula.]

"5th. The reserve artillery of the whole Army to consist of

100 guns, comprising, besides a sufficient number of light mounted batteries, all the guns of position, and, until the cavalry be massed, all the horse artillery.

"6th. The amount of ammunition to accompany the field batteries to be not less than 400 rounds per gun.

"7th. A siege train of 50 pieces to be provided [subsequently expanded to 100 pieces at Yorktown, including 13-inch sea-coast mortars and 100 pounder and 200 pounder Parrotts].

"8th. Instruction in theory and practice of gunnery, as well as in the tactics of that arm, to be given the officers and non-commissioned officers of the volunteer batteries, by the study of suitable text-books and by actual recitations in each division, under the direction of the regular officer commanding the divisional artillery.

"9th. Personal inspections, as frequent as circumstances will permit, to be made by the Chief of Artillery of the Army, to see to a strict observance of the established organization and drill, of the special regulations and orders issued from time to time under authority of the commanding general, to note the improvement of officers and men of the volunteer batteries, and the actual fitness for field service of the whole, both Regulars and Volunteers.

"These principles were proposed by General Barry, the chief of that arm, and although in some respects they were departed from in actual practice, they formed the ground-work on which was built the artillery service of the Army of the Potomac."

McClellan says in his report :

"The creation of an adequate artillery establishment was a formidable undertaking, and had it not been that the country possessed in the Regular Service a body of accomplished and energetic artillery officers, the task would have been almost hopeless." He drew together all the regular artillery he could lay his hands on, and when the 3 corps = 8 divisions embarked for the Peninsular campaign, they were accompanied by 49 batteries, aggregating 299 guns, of which 100 were in the artillery reserve. Of the 49 batteries, 20 were Regulars; of the 18 batteries of the reserve, 14 were Regulars. It will not be uninteresting to note the changes which the organization of the artillery of the Army of the Potomac underwent at different periods. First of all an increase in the number of army corps caused a draught from the reserve artillery, which nearly annihilated it.

"On the Peninsula there were three corps and two divisions, or ten divisions altogether." Four months later at Antietam, the Army embraced 6 corps and 1 cavalry division; total 19 divisions. "There accompanied the Army at Antietam 62 batteries; 7 only were in reserve." It will thus be seen that the creation of new divisions had in a few months well-nigh absorbed the whole of that superb artillery reserve, which took the field under McClellan at the beginning of 1862.

"At the close of the Peninsular campaign, General Barry, under whose immediate supervision the artillery of the Army of the Potomac had been organized, was appointed Inspector of Artillery, and Commander of Artillery in the defenses of Washington, being succeeded as Chief of Artillery by Colonel Henry J. Hunt, late Commander of the Artillery Reserve."

McClellan remarks in his report dated August 4, 1863, concerning this officer, that he "had commanded the artillery reserve with marked skill, and brought to his duties as chief of artillery the highest qualifications. The services of this distinguished officer in reorganizing and refitting the batteries prior to and after the battle of Antietam, and his gallant and skillful conduct on that field merit the highest encomiums in my power to bestow.

"General Hunt continued in this position during the rest of the War, stamping on the Service of which he was the head, the impress of a cultivated mind, stored with knowledge of the uses and capabilities of the artillery arm, the result of extensive experience, profound study, and reflection.

"At Fredericksburg General Burnside's army consisted of 6 corps each of 3 divisions, and 2 cavalry divisions. He had 67 batteries, 9 of which were in reserve. The 58 batteries attached to troops were with the divisions, a number varying from 1 to 4 being with each, depending on the arm of service and the strength of the division. In the cavalry each division had one horse-battery, drawing on the reserve for a greater number when needed. The effective strength of the division was about 5000 men. Two-thirds of the batteries were 6-gun, the rest had 4 guns each.

"At Chancellorsville General Hooker had 8 corps, including 1 of cavalry; a total of 23 divisions. Of the 71 batteries, 12 were in reserve, except 2 attached to the provost guard, the rest were assigned to the divisions.

"In the 11th and Cavalry Corps, half the artillery was formed into a corps reserve. The divisions averaged about 5000 men. The average number of guns, including the general reserve, was 3 per 1000 men. Down to this time the principles originally adopted as those upon which the artillery should be organized had been adhered to, and even the 12th Corps, which at Antietam had its guns massed as corps artillery, at Chancellorsville, under one commander, had its batteries distributed to divisions in accordance with the original plan. As, however, regiments had been compelled to surrender up their artillery to brigades, and these in their turn to divisions; so, as experience in manœuvring and fighting large armies was gained, did it become manifest that to most effectively organize the arm for administrative and fighting purposes, divisions must give up their artillery to army corps. "Accordingly, after Chancellorsville, the change was effected, the batteries of each corps being organized into what was designated an 'Artillery Brigade,' the commander of which had, or was supposed to have, his own staff, adjutant, quartermaster, commissary, medical officer, etc."

"As illustrating the disadvantages under which artillery officers often labor in the matter of rank, it may be noted that while these artillery brigades were considered equal in importance and fighting power to divisions of infantry, the latter were commanded by generals, the former, as a rule, were commanded by captains or lieutenants, except where here and there a volunteer field officer of artillery was found for the position. Apropos of this disadvantage, General Hunt in addressing the writer sets forth the following facts and opinions:

"Had General McClellan remained at the head of the Army, it (the artillery) would have got its proper place. He was the only general-in-chief at Washington, or of the Army of the Potomac, who comprehended the matter. His worst *drag* was found in the artillery itself; I mean in getting legal status for it. In the beginning General Barry told me, that when he went to the Adjutant-General and Secretary of War with McClellan's outline for organization of the artillery, in which he stated that for the present he wanted only two brigadier-generals, one as chief of artillery, the other as commander of the artillery reserve, the Adjutant-General said, that the law would not allow it, that it authorized one brigadier for each brigade of not less than four regiments to forty companies. That there were to be sixty

companies of artillery in the Army of the Potomac, more than enough for one, but not enough for *two*. To General Barry's statement that a battery was the equivalent of a *battalion*, and on that basis the artillery was entitled to five brigadiers, the Adjutant-General answered that a *company* was a company whether it was infantry, cavalry or artillery, and he prevailed with the Secretary of War. So General McClellan was forced to ask the appointment of an aide with rank of colonel (Hunt), and two with rank of lieutenant-colonel (Hays and Getty), and assign them in virtue of that rank to the artillery reserve. Probably this helped the Tom-fool idea then and still prevalent in our Army, that every artillery officer of higher position than battery commander was a '*staff-officer*.' When General Halleck took command of the Army in Washington, he decided that a battery was the equivalent of a regiment, it was commanded by a captain, so had no need for field officers. You will find in G. O. for 1862, I think, that artillery field officers were forbidden to be mustered into service; batteries to be received, not by regiment, but as independent batteries. The War Department decided 1st, that a battery was a company and therefore could not have generals, 2d, that a battery was a regiment, and could not have field officers, and stuck to both decisions throughout the War."

Birkhimer says in referring to this situation: "The erroneous ideas, to which attention has been drawn, led to others and to an invidious discrimination against the artillery in our own Army." Accepting as an established fact that the battery was the artillery unit, the conclusion was drawn, that there was nothing about the service of that arm higher than a battery which could be legitimately the subject of command. After quoting the general order referred to by General Hunt which prescribed that as a rule artillery will be called for and received by batteries, thus rendering the field and staff unnecessary, he says: "as a result when these batteries were assembled into brigades, the field and staff, here pronounced unnecessary, had to be drawn from captains and subalterns, thus increasing the duties of these officers and turning over the artillery brigades to those whose rank was in no wise commensurate with their commands." This arrangement was most unjust, and drove away many of the first officers of artillery, in point of merit, into the staff or other branches of Service, where they received the promotion they deserved.

"The laws of the Confederacy, moulded with greater wisdom, and in accordance with the organization of modern armies, allowed a brigadier-general to every 80 guns, a colonel to every 40, a lieutenant-colonel to every 25, and a major to every 12.

"The number of batteries in a brigade varied according to the strength of the corps to which it was attached.

"Of the eight corps at Gettysburg, the first battle after this re-organization was effected, four had five, and two had four batteries to a brigade; the 6th Corps brigade had eight batteries; the Cavalry Corps had nine of horse artillery, the latter in two brigades of four and five batteries respectively. Four-fifths of all the batteries of the Army had six guns, the rest four guns. Each brigade included at least one Regular battery.

"The advantages to be derived from assigning the artillery to larger commands were that the batteries were better cared for and capable of more efficient employment on the field of battle. As a result fewer guns were required to perform the same amount of work. Consequently in 1864 the number of pieces was reduced to $2\frac{1}{2}$ per 1000 men of other arms, having previously been in the ratio of 3 guns per 1000 men."

"When the Army of the Potomac took the field in 1864 the number of corps had been reduced from 8 to 4; the artillery from 67 to 50 batteries of field artillery with which were serving two regiments and three battalions of foot artillery, the latter armed as infantry for guards and escort duty. To each corps artillery brigade was attached a battalion of foot artillery for the various duties, artillery and other, required of foot troops. The two heavy artillery regiments formed part of the Artillery Reserve which, May 4, 1864, embraced 24 of the 50 field battery organizations of the army. Soon after the first movements of troops in the Wilderness campaign (1868), General Grant resolved to dispense with the Artillery Reserve owing to the swampy and wooded country, which did not permit of the use of artillery to advantage. After assigning 11 batteries to army corps, the remaining 13 were accordingly sent back to Washington."

In this connection it should be mentioned that two large depôts or rendezvous for artillery came into existence early in the War, which grew from small beginnings into large camps. One known as Camp Barry was located at Washington, and another for the Western armies at Nashville. At these depôts the newly formed volunteer organizations were received, supplied

with horses and guns and given preliminary instruction. Batteries from the field or elsewhere needing recruitment, remount and re-organization were here supplied, and at the close of the War most of the batteries were concentrated here to be mustered out or dismounted and to deposit their material.

Each 6-gun battery was reduced to 4, except the horse artillery. The surplus guns and horses, however, were only sent to Belle Plain on the Potomac, in readiness to fill gaps at the front." By this method of reduction the organizations were retained, together with the field officers belonging to the reserve; a matter of importance in an army where, as we have seen, that class of officers were prescribed; only the surplus *guns* were sent away. The retention of the caissons enabled the ammunition wagon trains to be correspondingly reduced. "Under this new arrangement, 31 field batteries were changed from 6 to 4 guns, and the brigades attached to corps were of 12 batteries each, 48 guns." The two brigades of horse artillery were consolidated into *one* of 8 batteries, 4 guns each, and attached to the Cavalry Corps. This reduced the number of guns in the horse artillery to 32, or to one-half the original number, thus making a total reduction in the field artillery of 94 guns. "In each horse battery, one section, two guns, was 12-pounder Napoleons, one 3-inch rifles. Most of the pieces ordered away when the reserve was broken up, were returned when the Army arrived before Petersburg to be used as guns of position in the siege operations. Besides these there was a siege train of 185 pieces, embracing siege howitzers, siege and sea-coast and Cœhorn mortars, 100-pounder, and 30-pounder Parrotts, 4½ inch rifles, and one 30-pounder Brooke rifle. The artillery operations before Petersburg from June, 1864, till May, 1865, were almost wholly in the nature of a siege, carried on under the supervision of the Chief of Artillery of the Army of the Potomac." "On taking the field for the final campaign in April, 1865, the size of the artillery brigades were reduced, and the surplus batteries either left temporarily in position in the lines or sent to the artillery reserve which had by sheer force of circumstances or in absence of specific instructions re-established itself with nineteen batteries, the supply (artillery) and ammunition trains of the Army. This reduction in the number of guns with the troops resulted from a desire to strip the Army of all impedimenta not necessary for the campaign then opening, of which the pur-

suit of the enemy was rightly expected to be one of the main features. The large brigades of twelve batteries organized when the reserve was broken up proved to be unwieldy, and there was a reaction. The brigades were reduced to a less number of batteries than they had before their increase, while the artillery reserve was re-established with a larger number than it had had before that time. Thus the organization of the artillery changed frequently during the four years of the War, as dictated by experience or necessity. Particular attention has been paid to the principles on which the Army of the Potomac was organized, and the changes made in that organization, for the reason that it was the most important army of the Nation. Its opponent was the Grand Army of the Confederacy, in which was concentrated the bone and sinew of the rebellious States, their warlike resources, organized and guided by the highest order of military talent at their command. In other armies than that of the Potomac, in their diverse fields of action, the artillery was variously organized, depending greatly upon the character of the country, the magnitude of the operations, including that of the forces engaged, and the views of the commanding generals; but as a rule, except in some of the Western armies, it will be found that as the War continued, as the resources of the combatants became compressed essentially into two or three well-organized masses, the tendency was to withdraw the artillery from control of subordinate commanders, and place that arm under the orders only of generals commanding the larger tactical units—divisions, and army corps. It may be well here to correct an erroneous impression concerning the artillery reserve, because of its name, which might lead to the idea that it played a secondary part in the field of battle. It was, to use a homely adjective, a *handy* body, quickly reached by the general in command, and its batteries were called for and run into every gap at the slightest provocation and early in the action. Its casualties will be found equal to those of the corps artillery. Its most important service was to beat the enemy by hard blows, and this it did early in its history at Malvern Hill, where every gun was employed, and with such effect that it confessedly saved the Army from serious disaster. The belief that a reserve was to be kept out of the battle, which, with many other erroneous ideas prevailed at the beginning of the War, was not figuratively speaking, but in fact, effectually exploded by its shells at Malvern

Hill, and its subsequent services in action sustained the reputation it there earned."

Regarding the organization and use of the foot artillery, the duties of this branch were almost entirely performed by volunteer regiments, designated heavy artillery, of which New York and Pennsylvania furnished the largest quota. At the termination of the War, the defenses at Washington consisted of 68 inclosed forts and batteries, having an aggregate perimeter of 13 miles, and emplacements for 1120 guns; besides 93 unarmed batteries for field guns having 401 emplacements; 20 miles of rifle trenches, and 3 block houses. The garrison of these works consisted at one time of about 18,000 disciplined and instructed foot artillery. Most of these regiments were sent to re-inforce Grant's army in the Wilderness, where they rendered gallant service as infantry. In most of the sieges in the South and West, the guns were served by infantry, instructed in their new duties as time and opportunity would allow. The siege of Fort Pulaski, Ga., in the spring of 1862 was notable as demonstrating for the first time the power and effectiveness of rifled cannon for breaching at long distances; at distances, indeed, hitherto untried and considered altogether impracticable. "A brick wall seven and a half feet thick, standing obliquely to the line of fire and backed by heavy casemate piers and arches was breached at 1700 yards by old 32 and 42-pounder rifles firing 64 and 84 pound James projectiles." In the previous history of sieges 1000 yards had been regarded as the extreme limit for successful battering, and then from four to seven days were required, against less than twenty-four hours, which served to make a practical breach in Fort Pulaski. The siege of Charleston was the occasion of bringing into use the heaviest rifled gun known at that period; the 300-pounder Parrott, familiarly known as "the swamp angel."

"The investing artillery at Vicksburg, consisted almost entirely of the field batteries of the besieging army. Of heavy guns proper, there were but 6 32-pounders, and the Navy supplied a battery of heavy guns. As the beseigers had no mortars, wooden ones were made by boring out logs of the toughest wood obtainable; these, with a bore large enough for 6 and 12-pounder shell, were hooped with iron and used as Cœhorns."

To attempt to relate in detail the use of the artillery during the Civil War, would be to write a history of every battle. It

might well adopt the motto of the Royal Artillery, "*Ubique*." Its officers were often called upon, in addition to their legitimate duties, to perform those of engineers, in the construction of field-works and batteries. They were largely so employed before Yorktown in 1862. The cannoneers of the horse batteries frequently acted as escorts to their trains, and on more than one occasion charged the enemy as cavalry. Staff officers who had seen service in the artillery were at times called upon for service with the guns; as for instance, Captain Pelouze, Adjutant-General's department, and Captain Turner, commissary of subsistence, members of General Hunter's staff, who, having volunteered for the occasion, were assigned to the command of batteries at the bombardment of Pulaski, where their knowledge and experience as artillerists proved of great value.

"Malvern Hill, July 1, 1862, was the artillery battle, *par excellence*, where the grand battery, including every gun from the general reserve, frustrated all attempts to pierce the Union line. It has been written by one of the leading generals of the Confederacy (D. H. Hill) that: "The result was exclusively due to the Federal artillery fire, which seemed as destructive as could have been that of 20,000 muskets, and I doubt if that number of muskets could have held the position and driven our forces back." General Hill also remarks: "He (McClellan) had an immense preponderance in artillery, and that of the most superb character. Artillery seems to have been a favorite arm of General McClellan and he had brought it to the highest point of efficiency." Again, a Confederate general says: "The battle with all its melancholy results proved, however, that the Confederate infantry and Federal artillery, side by side on the same field, need fear no foe on earth." In his report of the seven days' battle, General McClellan remarked: "It is not my purpose to make mention of distinguished services. I will simply call attention to the invaluable service rendered by the artillery, and say that its performances have fully justified my anticipations, and prove it to be our policy to cherish and increase that arm."

At Antietam, preliminary to the general engagement, a lively artillery duel took place between the opposing batteries on the opposite sides of the stream.

The practice of our batteries was so excellent, and their superiority over those of the Confederates so apparent that a Confederate general in his report says: "An artillery duel be-

tween the Washington (New Orleans) artillery and the Yankee batteries across the Antietam on the 6th was the most melancholy farce in the War. They could not cope with the Yankee guns." At Sharpsburg, during the battle of Antietam, four horse batteries held the centre of our line nearly the whole day, without any other support than a regiment of cavalry, under the cover of the hill in their rear.

At Chancellorsville, after the surprise and rout of the 11th Corps by Stonewall Jackson, and when the Confederates were pushing victoriously onward, Berry's division formed a line to check the advance. Pleasanton of the cavalry, ordered a cavalry charge of 400 men in column up a road into 10,000 of the enemy; desperate expedient merely to gain time, and in which the gallant leader of the charge, Major Keenan, 8th N. Y. Cavalry, lost his life. He then brought up his horse battery and such guns as he could collect, twenty-two in all, and with Sickles, assailed the enemy's right flank. The artillery of the 12th Corps, under Colonel Best, making fifty pieces in all, checked the advance in front. Swift destruction was poured into the Confederate ranks, the torrent was stemmed, and Jackson had received his death-wound.

The third day at Gettysburg was opened by the Confederates with a fire from 145 guns. "Ample means for reply were at hand under the able direction of General Hunt, and for two hours the artillery combat raged as a prelude to the less noisy but more deadly shock of infantry." Both sides suffered severely. No less than eleven caissons were blown up. "At 3 P. M. General Hunt ordered our artillery fire to cease, in order to cool the guns, and to preserve some rounds for the contest at close quarters. "Pickett's division in its charge that day received a severe fire from our artillery which did not delay, however, for a moment its deadly advance."

While personal anecdotes are not strictly appropriate in a professional paper of this description, still, as illustrating the resolute spirit with which our artillery was served, it may be permissible to introduce the following episodes of this battle:

Bigelow, commanding a Massachusetts battery, was ordered to sacrifice his command to give the others time to form a new line. He fought with fixed prolonge until the enemy were within six feet of him, and then retired with the loss of three officers and twenty-eight men. Phillips' battery which adjoined his had a similar experience.

Webb's brigade of the 2d corps had received the concentrated artillery fire preceding Pickett's charge. Cushing's battery "B," 4th U. S. on Webb's left, and Brown's Rhode Island, on his right were both practically destroyed by the cannonade. The horses were prostrated, every officer but one was struck, and Cushing had but one serviceable gun left. As Pickett's advance came very close to the first line, young Cushing, mortally wounded, holding on to his intestines with one hand, helped run his only gun down to the fence with the other, and said: "Webb, I will give them one more shot." At the moment of the last discharge, he called out "good-bye," and fell dead at the post of duty. "In the battles of the Wilderness artillery was wholly ruled out of use, owing to the dense woods and thickets; the massive concentration of three hundred guns stood silent, and only an occasional piece or section could be brought into play in the road sides."

From Fort Sumter to Appomattox the artillery had done splendid service, and won renown second to no other arm, and had it possessed a disinterested champion or chief at the seat of government when the peace establishment was fixed in 1866, it might have been given that permanent organization which the experience of four years' warfare pointed out as essential, and which all civilized nations, except our own, have long since adopted. The all important subject of a chief was strangled in the house of its friends, as the senior officers of the arm were entirely without harmony as to who should be the incumbent of the office. Nothing was accomplished save the placing of the four old regiments on the same footing as the 5th, which consisted merely in giving them a third major, and designating their companies, "batteries."

"A permanent artillery advisory board, organized in January, 1866, languished till the autumn of that year, when it adjourned never to reassemble."

General Hunt, to whom the writer had applied for information, closes his letter with the following remarks, which will also serve as a conclusion to this paper:

"I hardly know how to advise you as to your subject. "In a rash moment I promised two months ago to write a paper similar to yours for the Massachusetts Historical Society, 'The Artillery in the War,' to be read next January, and I am puzzled how to proceed. "The subject does not admit of the same

treatment as does that of the cavalry, etc., and I tried to get off by saying that it could not be done satisfactorily without going back, perhaps to the Revolution, and it would be all the way through, the screed of a 'sore head'; but they replied 'that was just what they wanted,' so I am committed." Referring to Lieutenant Birkhimer's work, he says: "You will find much that is suggestive in it, especially the disadvantages of the artillery having *no head-chief—a centre of administration*; hence, no rules or regulations for its service when connected with other troops; no recognized principles whatever for its employment; an utter ignorance on the part of most or many commanders of army corps and divisions of its uses and capacities; the marked contrast in the regard paid to it by Washington and Revolutionary generals, and those of our Civil War. The artillery wants an administration of *its own*. It will never be efficient without one." General Hunt excepts from these reproaches General McClellan, of whom he had a high opinion, as expressed in another part of this paper, and closes by saying: "I can hardly go further into the subject, but will be glad to answer any special questions, when you need information that I can give, for I am not losing my interest in the arm, *although it has cost me my whole professional career.*"

LIST OF WORKS DRAWN UPON AND CONSULTED.

Defenses of Washington	Barnard
Peninsula Campaign—Artillery Operations.....	Barry
The Peninsula (Campaigns of the Civil War).....	Webb
Chancellorsville and Gettysburg (Campaigns of the Civil War).....	Doubleday
The Campaign of Chancellorsville.....	Dodge
Siege and Reduction of Fort Pulaski.....	Gillmore
Campaigns of the Army of the Potomac....	Swinton
JOURNAL of Military Service Institution.	
The <i>Century Magazine</i> —War Articles.	
Historical Sketch of the Artillery, U. S. Army.....	Birkhimer
The First Regiment of Artillery.....	Haskin

A REGIMENTAL COURT OF HONOR.*

By LIEUT. J. H. WILLS, U. S. A.,

TWENTY-SECOND INFANTRY.

SINCE the War, and especially during the past few years, there has been great activity throughout the Army on all subjects relating to the profession of arms. More attention than ever before has been paid to the technical education of the officer. Schools of application for all branches of the Service have been established and officers of the line are now allowed to take advantage of special courses of instruction, a privilege hitherto only enjoyed by the staff. The Military Service Institution has been inaugurated and the numerous articles on military subjects found in the pages of its JOURNAL, evince the awakened interest that the Art of War is exciting throughout the Service. The spirit of improvement is to be seen in everything affecting the mental requirements of the officer and even in the matériel of his profession. The welfare of the enlisted man has been made the subject of special attention and the improvement in the condition of the soldier, if not always in the soldier himself, is very apparent. This spirit of progress is highly commendable, but another very important factor in an officer's, and therefore in the Army's efficiency, is being allowed to suffer from neglect, indeed I might say, to go by default; and that, too, in a matter in which the education of the officer is of equal importance with his mental training. I refer to the honor of the brotherhood of officers.

That more attention is needed the authorities high and low in maintaining a proper sense of honor in the Army will strike any one very forcibly on a perusal of General Court-martial orders published by the War Department. Often, where the sentence of the court has been dismissal for conduct unbecoming an officer and a gentleman, has the reviewing authority astonished the Service by reversal or mitigation. Cadets just learning to be officers have been found guilty of lying and their

* Read before the officers at Fort Keogh, Montana.

sentences of dismissal set aside, and there have been cases where by act of Congress culprits put out of the Army for crimes, the conviction of which rendered it scandalous for officers to associate with them, have been restored to their grade and rank. Thus does mercy outweigh discipline and military honor when the scales are held by the authority placed *over* the Army, but not in it. Nor are courts-martial free from the influence of mercy. Often when finding the accused guilty, and sentencing him to be cashiered, the members acting individually nullify their action by recommendations to clemency. There is too little punctilio in our Army. There is too little observance of the rules of courtesy and official etiquette and too much disposition to find fault, to grumble and to give utterance to our thoughts of our superiors in rank, our commanding officers, our comrades. With so little attention paid to this most important part of our officers' training, with so few well-defined usages and customs of the Service regulating the action of officers in cases affecting their honor, or that of their comrades, the only wonder is that the standard of honor in the Army is so high.

In an edict of May 2, 1874, published by the Emperor William to his army on the subject of courts of honor, will be found the following noble words:

"I expect from the entire body of officers in my army that honor shall be in the future as it has been in the past, their highest treasure. To maintain it pure and spotless must remain the holiest duty of each officer as well as of the entire body. The fulfillment of this obligation carries with it the conscientious and thorough discharge of all other duties. True honor cannot exist without loyalty to death, without steadfast courage, firm decision, self-denying obedience, perfect truthfulness, strict secrecy, as well as self-sacrificing performance of even apparently the most trifling duties. It demands further that the dignity which arises from the consciousness of membership in that body to which is intrusted the defense of throne and country, shall find expression in the officer's every-day life."

If officers in their daily lives would carry out the precepts given in the words so fitly spoken, there would be no need for a court of honor or a court of any kind, but as they (speaking generally) do not and will not, the necessity exists for some measure by which the standard of honor in the Army may be raised and maintained.

In the old Army (of which naturally enough we hear a great deal), if traditions are to be relied upon, a nicer sense and finer feeling of honor existed. The code was to some extent in vogue in those days, and the knowledge that one might have to face the muzzle of a pistol at ten paces and with an active, intelligent agent in control of the trigger had doubtless a wholesome effect. What we might term drum-head courts of honor held sessions in those days, and often when an officer by disgraceful actions showed that his sense of honor was asleep or dead, he would be suddenly summoned before an assembly of three or four of his brother officers and advised that the best interests of the Service, and incidentally his own good, required that his resignation should be forthcoming, and I may add that it generally forthcame. Now the duel is a back number in this country. It has been laid aside for the slower, surer and juster decision of a court. The Court-martial and the Court of Inquiry are the only legal engines for dispensing justice in our Service. That the aid of the latter is so seldom invoked is pretty positive proof of its inadequacy. The former is of course indispensable, but there are cases, in which the honor of an officer might be affected, not coming within the jurisdiction of a court-martial.

The German and Austrian armies have what are called courts of honor or honor courts, to give an exact translation.

The object of the Honor Court is to preserve the honor of the corps of officers as well as that of each individual.

It is their province, 1. To proceed against those officers whose conduct does not accord with a proper sense of honor or with the status of an officer where it is necessary by the removal of an unworthy member to preserve the purity of the honor of the corps.

2. To clear officers from groundless imputations on their honor, where other methods suitable to their station are denied them.

Courts of honor have jurisdiction, 1. In cases of acts of omission or commission on the part of an officer, which are repugnant to a proper feeling of honor, or to the status of an officer, and which therefore imperil or injure the common honor of the brotherhood.

2. In those cases where officers for their own protection demand the verdict of a court of honor.

In the German service every officer is subject to trial by a court of honor. I will only consider that over company officers,

the Regimental Court of Honor. This consists of all the officers of the regiment, battalion or independent detachment, the commandant being the president. The organ of this court is called the Council of Honor, consisting of three members, a captain, a first and a second lieutenant. These and their substitutes are elected annually. All the officers of the regiment voting for the second lieutenant, all save the second lieutenants for the first lieutenant, and all the captains, field officers, and the staff for the captain. Any officer has the right to bring to the notice of the council of honor or of the immediate commandant of the accused any acts which may jeopardize the honor of the brotherhood of officers. It is the duty of the council of honor in such cases to make a report to their commandant. The commandant then decides if, and what further steps are necessary, and if he deems the case of sufficient importance, he directs the council of honor to pursue their investigations and make report to him, either verbally or in writing. When he considers the case of sufficient importance to merit the action of a court of honor, he reports the facts to the commanding officer, who has power to convene a court of honor, submitting at the same time the proceedings and decision of the council of honor. When proceedings of a court of honor are begun, they are not interrupted until finished, and their competency is not affected by the removal or resignation of the accused. The council of honor, under the direction of the commandant, conducts the proceedings of the courts of honor, and these are in writing and must be confined to the demonstration of important facts, carefully avoiding all additional and unnecessary proceedings. The hearing of witnesses is before the council of honor, all members of which must be present. The testimony of all witnesses is sworn except that of officers, who certify as to the correctness of their testimony. The accused is allowed a hearing, and is acquainted with the charges before the convening of the court of honor. He is allowed access to the proceedings in the presence of a member of the council of honor. When the court of honor has completed its investigations, the accused is permitted to make his defense. He may hand in a written statement composed by himself or his counsel. Afterward, when the court of honor is assembled to render a verdict, the accused is allowed to defend himself either verbally or otherwise, or he may have another officer, his junior in rank, conduct his defense. For this purpose he is usually allowed eight days,

which period may be further lengthened by the commandant. When the council of honor has completed its investigations, a session of the court of honor for verdict is called. Before this, attendance at the sessions of the court do not appear to be compulsory, but all the officers that are members must be present at this sitting. Unless the commandant and at least eight other officers with the right to vote are present, the court of honor cannot give a verdict.

When a court of honor is assembled for verdict its members are not sworn, but are warned by the commandant to give their votes as men of honor according to duty and conscience, and with due regard to the facts bearing on the case. Then the complete proceedings are read by the council of honor. The defense follows, and until this is closed the accused is allowed to remain. Then after due deliberation under direction of the commandant, which is preceded by the reading of an opinion in writing from the council of honor, every member gives the council of honor his vote verbally. The voting commences with the council of honor and then the other members of the court, and is in the inverse order of rank. Each member must sign his name to his vote. The accused has the right to challenge any member before the session for verdict. The decision of the commanding officer in this case is final. The following are excluded from participation in the final session: accusers, witnesses, defenders, near relatives, brothers-in-law and officers in arrest. The following are considered near relatives: fathers, brothers, sons, own nephews, own uncles and own cousins.

The findings of a court of honor may be acquittal; guilty of jeopardizing the honor of the corps, with a demand for a reprimand; guilty of injury to the honor of the corps, with demand that the accused be discharged with simple liberation of service, *i. e.*, loss of position in the Service; guilty of injury to the honor of the corps with aggravating circumstances, with demand that the accused be cashiered. When an officer is cashiered in the German army he loses his position and title as an officer. The court reaches a verdict when a majority of three present agree. When there is no majority for any one sentence, the vote for the harshest is coupled to that for the next mildest and so on until an absolute majority is reached. The members are enjoined to preserve secrecy until the publication to the accused of the sentence.

The entire proceedings after going through the proper channels are submitted to the Emperor for his action.

The court of honor in the Austrian service does not differ materially from that in the German, except in its composition. For the trial of cadets and company officers a permanent court of honor is located at the headquarters of each division. This court of honor consists of nine members, one colonel as president, two field officers below the rank of colonel, four captains and two subalterns. When an officer is tried before such court he may appeal his case, if found guilty, unless the vote was unanimous. The effect of the decision of the commission of appeal, if it reverses the finding of the court of honor, is the same as if the accused had been acquitted in the first place. The decision of the commission of appeal and the proceedings of the court of honor in any case are forwarded to the commanding general of the division for his action.

It is not my purpose to outline any plan for courts of honor in our Service. That we need something of the kind will, I think, be admitted. That our Service would be benefitted by a higher standard of honor any one can see, and that a court of honor would bring about this most desirable result, a few minutes' thought will, I think, make plain to all. In the first place, an officer would always have a court where his sense of honor might be saved from outrage. If he considered himself insulted by a comrade, his motives questioned, or his honor impugned, by an appeal to the court of honor of his own regiment he could have his character cleared from suspicion and his honor established in the eyes of his comrades. A regiment would be the custodian of its own honor, it would possess the power of getting rid of unworthy members and of compelling conformity to the regimental standard of honor. If officers were liable to be summoned before some such tribunal to substantiate their careless speeches, a greater degree of vigilance would be exercised in controlling the unruly member.

There is too much looseness of speech among us. We are too much given to saying what we think, to criticising with undue freedom our superiors and inferiors, officially and socially. In a large measure a court of honor would do away with the publicity that is given to the proceedings of courts-martial. Each regiment would eject its own black sheep without sounding a trumpet note to attract public attention. When charges are pre-

ferred against an officer, the fame thereof spreads abroad and the crime in all its details, disgusting or otherwise, is told in Gath and published in the streets of Askalon. The people form their ideas of the Army from these rare and isolated cases, and this state of affairs would in a great measure be prevented. Not the least among the benefits certain to follow the adoption of regimental courts of honor would be the renewed life given to *esprit de corps*. Each regiment would have the power to preserve its reputation, each officer would feel that he was the bearer of his regiment's honor as well as of his own. An offender would have a hearing before his comrades in arms, before those men with whom a large part of his life must be spent, and upon their decision would hang his future life as an officer. The necessity of making apparent to the officers of his own regiment that he was a man of stainless honor, of unwavering courage and tried integrity, would be paramount and a high sense of honor would begin where charity does, at home. With our garrisons increasing in size each year, the difficulties to be overcome in instituting courts of honor will soon vanish.

It is said to be a fact that armies, like nations, are apt to become demoralized during the piping times of Peace. Cannot our Army by taking a leaf from the book of the past learn how to avoid in whole or in part the consequences of inactivity and preserve in Peace as it has done in War, its discipline, its efficiency and its honor?

PRACTICAL WORK FOR INFANTRY.*

By LIEUT. E. S. AVIS, U. S. A.,

FIFTH INFANTRY.

THAT infantry is best prepared for war which is best able to undergo the fatigues and privations of war and to comply with the requirements of modern tactics. The modern soldier must be capable of great physical endurance; he must understand his weapons and be able to use them to the greatest advantage, and to exercise his own judgment at times. The non-commissioned officers occupy a much more important place in modern war than was formerly the case, and therefore should receive a careful training in their duties. The intermingling of troops in battle requires skillful leaders in close contact with the men, that their efforts may be effectively directed.

The ancients were well aware that no man could attain excellence without labor, especially in war, and so required their soldiers to practice, in peace, severer exercises than would be required in war. The application of this principle to the practical work of war is now receiving great attention at the hands of modern nations, which are now trying to develop, in their soldiers, those physical, mental and moral qualities which are most needed in war.

MARCHING.

Infantry must make long marches before arriving near the battle-field and then be in condition to reach the right place at the opportune moment and in form to move rapidly over distances as great as 2000 yards, under fire, much of it at a run, and to drive the enemy from a covered position. Such conditions call for good staying qualities and require infantry to be trained to hard work, long marches, and to run long distances. An important step has been taken in the right direction by those department commanders who place their troops in summer

* This essay received in 1889 a special prize from the M. S. I. for the best short paper on an infantry subject.

camps. Marches should be frequently made in the vicinity of the post; companies could be sent out, for a day or two, to bivouac and to perform some special patrol duty. Care of person, feet and clothing could be spoken of during such marches. Forced marches should be made occasionally so that the troops could know how much they can accomplish.

WALKING AND RUNNING.

There should be a walking and running track at every post, 100 or more yards long. Men should begin by walking at an ordinary rate for 100 yards and gradually increase the pace and distance until they can accomplish long stretches. Burdens should be gradually added until the men can walk faster and carry heavier loads than will be required in war. The same method should be pursued in running until the men can run 2000 yards with a heavy burden and finish in good wind. The men should be shown the step best suited for walking and that best adapted for running. Two gaits, of course, are necessary; one for long distances or steady gait, and a rapid gait for a quick mile or two. After the work on the track the men should be practised in cross-country walking and running. Provision should be made to place temporary obstacles on the track if permanent ones cannot be made on a separate track, so that the men may be accustomed to leap ditches, climb walls, pass hedges, fences, etc. It may often be expedient, in battle, to send ammunition forward by men, who should be trained to carry burdens and to advance rapidly. The men should be taught to run in column and in line.

GYMNASIUM.

A gymnasium well equipped with simple machines, should be at each post. Ladders, ropes, bars, horses, poles, and escalating apparatus could be provided at small expense, and a room economically built, in connection with a drill shed. During the winter all available men should be trained in the simple exercises, and gradually advanced to more difficult and practical feats. Men should be able to jump up, down, and forward, with and without poles, standing and running, as well as backwards and to the side, with arms and burdens. They should walk a beam, plank, and log, cross a pole, rope, etc., with and without burdens. It may be necessary to carry a wounded comrade over such obstacles, or to take a large rope over a stream. There

should be a large tank in the bath-house, for swimming, and the men should be practised in the neighboring streams, with and without burdens.

SETTING UP.

As recruits are required to use muscles which have generally been little developed and appear awkward, it would seem wise to begin their military instruction with such simple gymnastic exercises as would bring the proper muscles into play. Turning the head, bending the neck, extending and bending the arms, wrists, fingers, legs, knees, feet, etc., are readily taught, and recommend themselves as preliminary to drill. This method is so natural that it is almost a matter of surprise that the Americans, who are so quick to discover and apply the best practical methods, have not already introduced this system into their military training. In our great haste to prepare men to "march in review," have we not neglected practical methods? In place of our limited "setting up" we should have practical gymnastic exercises; instead of "balance step" the men should be taught a good walking step. On the march men take a natural gait; why waste their time on the constrained and unnatural "balance-step"? Good walkers are better than precise steppers.

If one hour every morning be spent in running, walking, and gymnastic exercises we will soon have hardy soldiers. Instructors will have ample time to point out faults and to teach the men to economize their strength.

BAYONET EXERCISE.

The bayonet exercise is good training and increases the confidence soldiers have in the rifle. They should be able to charge bayonets, thrust and lunge from any position, as well as from "guard." The absolutely necessary parries are few, but handiness repays for extra time. The parries should be called right, left, and head, and high and low, which would cover the ground with a simpler and more suggestive nomenclature. Cavalry should be received on the left side and the thrust made after the horse passes. The men should be taught to carry and hold the piece horizontal in passing obstacles. They should be shown how to sling the piece by passing the right arm through and resting the piece on the right shoulder while the right hand should steady it near the lock. Bags should be stuffed and suspended at proper

intervals, and the men should advance, thrust at them, and disengage without halting.

TARGET PRACTICE AND ESTIMATING DISTANCE.

The enemy must be destroyed, and target practice must be practical. At skirmish drill and in war, men are cautioned to fire low; why should not the bull's eye on all targets be at the bottom? Custom is a strong cable, and we should make it second nature for the soldier to fire low in battle.

Estimating distance should be practised always, for no man can become too expert. The soldier should be able to judge height, depth, distance and interval, by sight, sound, marching of troops, stepping off, etc. Those who show special aptitude should have special training. The necessity of correctly estimating distance on the battle-field cannot be overestimated.

A happy method of impressing the importance of this drill is to arrange targets to represent a battery, cavalry, or skirmishers, and bring the men unexpectedly against these targets and require them to estimate the distance and to deliver a volley, mark the result, and then fire again with proper elevation. The captain can readily arrange some exercise to suit the ground and the target; such as to take a battery, receive cavalry, attack a position, etc. Every opportunity should be improved. On the march the men should be required to pick out trees, houses, hills, approaching travellers and vehicles, and estimate distances. In taking a defensive position, ranges should be stepped off and marked to denote where attack should be received by volleys and by rapid firing.

FIGHTING.

We have passed the time to expect companies and regiments to be led, in a new war, by men trained in the actual experiences of war. It is wisdom, therefore, to cast about us for a means of properly training those upon whom such grave responsibilities will rest. We should have systematic, theoretical and practical training in the field exercises which reproduce the real incident of war.

Deployment should be taught to the squad, for, often small detachments will be sent forward and compelled to deploy, close and extend, as well as turn or wheel in different directions while deployed.

Infantry must be taught to advance over all kinds of ground.

and to improve its advantages while steadily pressing to the objective. The storm of bullets which will sweep the coming battlefield will allow no standing man to resist it, and yet the enemy must be reached, for he will remain in his position as long as we stay at a distance, and we cannot have our attack demoralized by fearful losses. The intrenching tool must be used at times. The men must be taught to use cover to support the rifle when aiming, and to protect themselves when loading or watching the enemy, and to advance in the attack, or, to fall back when necessary. War is earnest and success in it requires preparation in peace.

Officers should be required to work tactical problems on maps, and on the ground, writing out all orders and the question or idea then submitted for general discussion. Instructions should be given the non-commissioned officers, and special privates upon the elements of topography, map-reading and sketching; conventional signs should be explained and the men taught to find their way by maps, cardinal points, sun, moon, etc., placed on the ground, and required to find the place on the map, and the reverse, etc. Much of the preliminary work of patrol duty, advance-guard and outposts could be lectured upon. A lecture should precede every exercise.

Near the post there will often be woods, houses, villages, bridges, streams, railways, camping ground, defensive positions, etc. The company, no matter how small, should be taken to such places and shown how to reconnoitre, attack and defend them under infantry and artillery fire, as well as to receive cavalry charges from various distances. The men should be taught how to prepare a house for defense, loophole a wall, barricade windows, doors and streets, to throw up rifle pits and to use cuttings, hedges, trees, etc., and how to attack the same with the least exposure. Simple bridges should be constructed, and the men taught to find fords suitable for cavalry, infantry, artillery and trains, and when and how long they would be good.

After the men are shown the attack and defense separately, the enemy will be represented. Heights, woods, fields, etc., will be occupied by the enemy, who will have detailed instructions, at first, concerning the part he is to play. The men will advance against the enemy, as in war, who will fire when the attack is exposed, and regulate the firing to the distance of the attack, the position will be occupied, the defenses pursued, or the attack abandoned as the circumstances dictate.

The instructor will see that the position is properly and advantageously occupied, and that the different phases of the attack and defense are properly managed. Practice will soon make the men expert and develop self-reliance and prompt decision, as well as the faculty of giving clear, precise and correct orders, in the officers and non-commissioned officers.

OUTPOSTS.

Ground should be selected and pickets, with their sentries properly posted and the duties explained, as well as the best positions pointed out, for day and night. Friendly and hostile parties and patrols should advance and retire, orders and information be transmitted and received, sentinels be relieved, attacked and made to fall back, the men performing their duties as in case of war. Patrols should be sent to explore the ground near and to surprise a hostile sentry, and should make a proper report.

ADVANCE GUARD.

Whenever the company marches, especially to the summer camp, it should have its advance guard; wherever the country permits, the front will explore as in time of war; when cultivated fields limit the action of the point the captain will point out the positions the different parts should occupy. It should march along the road when necessary, extend into the fields upon either side, examine woods and defiles, ascend heights, observe bridges and streams, question travellers and make reports from time to time, and submit a sketch of the route. The captain will explain the duties of the point should the enemy be discovered, and, for practice, may announce, "hostile patrol 1000 yards to right front," etc.

SUMMER CAMP.

Companies should be sent out from the camp for exercises, and, the captains, having agreed upon some idea, as attack and defense of a wood, defile, etc., should work out the problem for the instruction of their men. Companies may be sent out with special tasks so that they will unexpectedly meet each other, as enemy, and work out their problems. Reports should be made in all cases and the execution discussed. Outposts should be placed around the camp after a company has been despatched with secret orders to surprise the camp. The time should be

spent in practical exercises. While any supposition can be made upon the strength and position of the enemy the ground must be taken as it is. Two months' camp should give 30 company exercises and at least 10 company-against company exercises; 7 to 8 A. M., walking, running, gymnastic, bayonet, etc., exercises; 9 to 12 field exercises; 2 to 2.45 P. M., lecture on exercise for next day and questions on last; 3 to 4.30 P. M., battalion drill, and attack formations.

REPORTS.

In all of these duties there will be many written reports and orders, and much verbal transmission of information and orders, which must be properly and timely performed. The date and hour, place and method, should be specified, and knowledge and surmise separated. Orders must be precise, clear, and brief. The men should know the cardinal points and the report should locate the enemy, or place, as "near the north edge of such woods," "south of big brick house, etc., moving to the east," with three, or so many, men in his detachment, patrol, etc. The necessity of prompt and accurate reports about the enemy must be pointed out.

PRACTICABILITY.

Can such work be done by our infantry under existing circumstances? Much can be done: instead of one or two hours for drill let there be four or six, and it will not be long until great progress will be seen. After war begins these duties are learned only by paying a big price in life. Let them be learned now. Certainly the infantry can learn the simplest and yet most important duties of war. The cumbrous post guard, a relic of permanent fortifications, can, and should be replaced by outpost and picket duty. Warehouses could be locked and visited from time to time by a watchman from the guard house, whence prisoners rarely try to escape. Citizens use this common sense method. More men would be free for instruction. Soldiers quickly learn a thing when they see its advantages and uses. Working hours and details could be regulated to conflict very little with practical training.

INSPECTIONS.

Much interest is taken in practical work by inspectors and they would readily arrange their inspections to cover practical exercises. They would require:

Reconnaissance: The skilful and prudent conduct of detached men and patrols:

In examining ground, etc.

In searching for and watching the enemy.

In returning from the enemy.

In the correct and speedy transmission of information.

Outposts: The proper selection of a line of outposts and sentries.

The sentries properly instructed how to act and to transmit information in the several incidents already described.

Defense: The intelligent occupation of a position.

The best manner of reinforcing.

The most suitable accessory defenses.

The method to get an effective fire.

The kind of fire for different distances and how directed.

The manner of estimating distance of enemy.

The kind and time of reports sent back.

The counter attack.

The abandonment of the position.

Attack: The formation for attack, skirmishers, supports and reserves at different stages.

The different kinds of fire and how directed.

Action when attack is repulsed.

Action during voluntary and forced retreat.

Attack of woods, town, height, bridge, defile, etc.

Retreat from localities.

Retreat through defile.

Front attack.

Flank attack.

Enveloping attack.

Advance by rushes.

Assault and occupation of position.

Pursuit of enemy.

Thus covering much useful work.

If the inspectors be authorized to demand such work by infantry it will be as cheerfully and thoroughly done as any now required.

THE MILITARY SITUATION IN FRANCE.*

By LIEUT. JOHN A. LOCKWOOD, U. S. A.,

SEVENTEENTH INFANTRY.

IN the history of the world there are several examples of sudden and sharp contests between nations, resulting in the overthrow, at least temporarily, of some great military power. But of all the struggles of this nature, the most recent, the one which about twenty years ago, after a period of only seven weeks, resulted in the capitulation of Louis Napoleon at Sedan, is unique in that its short duration, its succession of French defeats and the final complete success of the Prussians, surprised not only the vanquished French, and the more or less interested nations of Europe who were merely spectators of the struggle, but the victors themselves as well.

In 1870, France, intensely jealous of the growing importance of Prussia, saw fit to object to the seating of a prince of the House of Hohenzollern on the Spanish throne—at that time unoccupied. Although the prince in question voluntarily withdrew as a candidate, this did not satisfy France, or rather the cabinet of Napoleon III.; whereupon a demand was made by the French Government that the King of Prussia should never lend his assistance to any German prince to ascend the Spanish throne. The refusal of the king to comply with this demand led to the almost immediate declaration of war on the part of France. It was Napoleon's idea to attack Germany by dividing his army into three parts, and accordingly preparations for a grand invasion were made, and he was only prevented from carrying out this plan of campaign by the more rapid movements of the Germans, who did not wait to be attacked, but, in a marvellously short space of time, by means of their perfectly organized staff department, pushed their forces across the Rhine into France, and met the French in a series of hotly contested engagements in

* This article is to some extent a review of the work of M. EARNEST JAEGLÉ, Professeur à l'école Militaire de St. Cyr. La Prochaine Guerre, France.

eastern France—the short campaign ending in the surrender at Sedan of Napoleon and his demoralized army. So confident had the French been of beating the Prussians on German ground that it is said they even entered on this disastrous campaign without providing themselves with maps of eastern France, and this omission led to great consternation when it was found that there, and not in Germany, would be the seat of war.

The surrender at Sedan virtually decided the contest, although owing to the obstinacy of the men at the head of the French Republic (which was declared as soon as Napoleon's surrender was known) in refusing to comply with the demands of Germany, hostilities were prolonged until the siege and first surrender of the city of Paris resulted in the German terms being acceded to. These terms included, besides the payment of an immense war indemnity, the cession of the province of Alsace and part of Lorraine to Germany. These provinces having once been a part of Germany, were now claimed by her as necessary to insure her against future attacks from France, and aside from their military importance, the possession of the Rhine provinces was to the French national vanity a substantial proof of their superiority over Germany. France in them possessed German territory, and had subjects of German origin who had grown to regard themselves as Frenchmen. Then, too, the vigorous and healthy peasants of these provinces, physically far superior to those of western France, furnished the nation with large, well-developed men for war as well as for the arts of peace. The loss of these provinces is a perpetual thorn in the side of France, and no patriotic Frenchman admits that they are lost forever. As a proof of this assertion, in the Place de la Concorde in Paris, is a magnificent colossal statue given by the citizens of Strasburg (the capital of Alsace) to the citizens of Paris prior to 1870. This statue is kept draped in perpetual mourning, and, it is claimed, will be so draped until the French tri-color once more waves over Alsace. On the base of the statue is inscribed the date when Strasburg became a city of France. Next follows the date when it was captured by the Germans, and lastly, a place is left blank for the date when it will be regained by France.

The cession of the Rhine provinces thus placed Metz and Strasburg, the keys of the French frontier of 1870, in German hands. It gave France a new frontier and a very open one—a frontier unprotected by any great natural obstacles, for the Ger-

mans now held both sides of the Rhine and the northern passes of the Vosges Mountains, the same passes by which the French armies used to march to the Rhine under Napoleon I. All now are within German territory. Taught by the hard lessons of defeat the French Government set to work to put the new lines into a thorough state of defense.

Successive war ministers have steadily worked upon the plan originally laid down by the French engineers in 1871. Millions of francs have been spent ; and now, after nearly nineteen years, the work is about finished. Probably so vast and complete a work of military engineering was never done before in so short a time. The French engineers were not content to erect upon the new frontier three or four first-class fortresses to serve as points of support for a defending army. They have closed it with a double line of works, linked them together with an elaborate system of railways, and, besides re-fortifying Paris, they have also fortified Lille and Lyons. Since the war Paris itself has been surrounded with a new circle of forts, placed so far in advance of the old line that a bombardment of the city would now be impossible without the previous capture of several of these forts. In 1870 the distance between the city and forts was not so great as to prevent bombardment without their capture by firing over and between them, but the new girdle of sixteen forts not only protects the city from bombardment but from investment as well on account of its great extent. Already in 1870 Paris was the most extensive fortress in the world. Since then it has been added to and strengthened in a manner absolutely incredible. The city is situated in the valley of the Seine. On the right bank of the river, at the city, a vast plain has been formed by the action of the water. At this point the Seine is one hundred and fifty yards wide. Paris was surrounded by a wall under Louis XIV. Under Louis Philippe (1840-45) this wall was greatly added to. To-day its irregular front includes ninety-five bastions and salients. The moat is dry, but can easily be flooded from the Seine. This principal inclosure is surrounded with the sixteen detached forts referred to. These are connected by a great number of intermediate works of less importance.

Notwithstanding these extensive preparations to resist an invasion and to prevent the capture of Paris, the question arises, *will* they prevent a fourth invasion of France? In the quite probable event of another war with Germany, will that nation try

to dictate again the terms of peace from the halls of Versailles? She will probably make the attempt; for such is the national pride of the Frenchman, or rather of the Parisian, that Prussian shells must actually begin to drop rather frequently into his favorite cafés before he will believe in the reality of German victories.

The author of one of the latest works emanating from a French military source, "Before the Battle," truly affirms that the quality of the men composing an army exercises an influence more decisive than can be claimed for all its implements of war. He further affirms that the French soldier has all the qualities which should make him the soldier *par excellence*. "His zeal, his vigor, his self-abnegation, render him to his adversary the most redoubtable foe. For vivacity of spirit, for active intelligence, for defiant bravery he is without a peer." The soldier, whose praises are so highly and characteristically extolled, appears to the curious foreigner, who beholds him in time of peace, as small in stature, slouchy in appearance and poorly "set up" by the side of his English or German neighbor.

The French soldier is allowed two meals a day, the first at nine o'clock in the morning, the other at four in the afternoon. Coffee is drunk at sunrise. The privates mess in the same squad-room where they sleep, the tables being suspended by cords from the ceiling and hoisted up when not in use so as to be out of the way. Each man has bread enough issued to him to last three days at a time, and each one is provided with an iron basin called a *gamelle*, in which he carries his rations from the kitchen. Formerly several men ate out of one *gamelle*, but this social custom has fallen into disuse. Meat is served every day at the four o'clock meal. In addition to their clothing and subsistence, the French soldiers are paid one sou (two cents) a day. This is paid every five days, when it amounts to half a franc. Military service is now compulsory for all classes of citizens of twenty years of age, with some exceptions. The only sons of widows, the physically disabled, etc., are exempt. Those who are graduates of the Polytechnic, or who can pass a certain examination, are let off with one year of service. Political influence does not appear to count for much in excusing any class from this compulsory service. The line between officers of different grades and between non-commissioned officers and privates is very rigidly drawn. The captains and lieutenants messing separately, and

the non-commissioned officers not associating in any manner with the privates. A large proportion of the officers are promoted from the ranks every year, but candidates for commissions must first graduate at a military school near Paris, intended only for such candidates where the course takes two years to complete it.

French soldiers are permitted to ride in all public conveyances for half fare if in uniform, while at the theatres a soldier in uniform is, by custom, allowed to push by the long line of civilians, who may be patiently waiting their turn to buy tickets, and buy the best seats he can afford for half price. General Boulanger, when Minister of War, did much to raise the status and improve the condition of the French soldiers. His famous order permitting them to wear beards did more, it is said, to raise him in the estimation of the rank and file than any other of his official acts.

Reprints and Translations.

MODERN CAVALRY ON THE FIELD OF BATTLE.

BY COLONEL R. S. LIDDELL,

LATE COMMANDING 10TH ROYAL HUSSARS.

(Reprinted by permission of The Aldershot Military Society.)

CONFIDENCE in one's own arm is most desirable and should be fostered, if at the same time we can learn how to work with the others, remembering that while cavalry give the information to and hide the movements of the army, while artillery shake and disperse the enemy's formations, and prepare the way for attack, it is the infantry alone who can assault and hold the positions, and it is for their advance, and to bring them up to the point that determines the battle in the condition most favorable to insure success, that all the efforts of the other two arms must be devoted.

I have made these preliminary remarks, as from my paper being entirely given to the action of cavalry it might appear that I am claiming more for that arm in the battle-field than is reasonable, but I wish it clearly understood that whatever I may say is only in an auxiliary sense to the action of infantry, and I trust that I shall not be thought underestimating other arms, while showing unbounded confidence in my own.

The necessary rest required by Europe after the exhaustion of the wars of Napoleon resulted in the long peace which succeeded the campaign of 1815. This, and the improvement that took place in fire-arms in the next forty years, gave room for speculation as to whether cavalry would play as important a part in the future as it had done in the past under Marlborough, Frederick the Great, Napoleon, and Wellington.

The Crimean War helped to confirm the opinion that the days of cavalry had gone by. No account was made of the enormous distance by sea that the cavalry had to be transported, the unfavorable nature of the seat of war for that arm, the little scope given in a campaign that resolved itself into a siege, the smallness of the cavalry force employed, and the difficulty in keeping up a fresh supply of horses. After this war came the introduction and improvement in the breech-loader, and with it opinions were strengthened that cavalry duties would be still further limited, and its traditions for a time appear to have been lost.

The awakening from this transient period of theory came from a nation not trained to arms, and it is to the American Civil War that we owe the revival that took place in the use of the cavalry arm.

The raids made by the Confederates under Morgan, Stuart, Forrest, and by the Federals under Sheridan, drew attention to advanced cavalry work, such as scouting, reconnaissance, outpost and dismounted work. As particular examples we may select Morgan's boldest and greatest raid in 1862, when he passed through Kentucky and Indiana, capturing large stores from the enemy. By his rapid and skilful marches the Federal officers were completely bewildered. He was absent from his own army twenty-four days, in which time he travelled 1000 miles, capturing seventeen towns, and destroying all the Government supplies and arms. In a second raid he forced the Federal Army to fall back, by taking possession of the railway in its rear which brought its supplies.

In October, 1862, Stuart made his greatest raid through Pennsylvania around the Northern Army. He set out with 1800 cavalry and four pieces of horse artillery and crossed the Potomac. The telegraph lines were cut in all directions, railways obstructed, and a large number of horses captured, and all the public stores and buildings were destroyed. His position at this time was very critical, ninety miles from his own army. He considered it less dangerous to return by the opposite way to which he came.

Forrest used his cavalry in every possible manner, dismounting in the battle-field and employing it as infantry. It also acted as cavalry. In October, 1864, during a raid he impeded the navigation of the Tennessee River, which was filled with Federal gun-boats. Choosing a strong position on the bank he masked his guns, and awaited the approach of the enemy's vessels. He captured a gun-boat and a transport, and manned them with his own men, but his naval expedition did not last long. Pursued by several gun-boats, he had to run his ships on shore, when the troopers gladly mounted their horses again. His object was, however, gained—inspiring alarm throughout the country and occupying a considerable number of the enemy.

Later on the Federals copied this system, when the raids of Sheridan, with his 10,000 horsemen, armed with the magazine rifle and revolver, with sword attached to the saddle, brought about the final overthrow of the Southern Army.

The next campaign that took place was in 1866, known as the "Seven Weeks War," when large bodies of cavalry were used by the Austrians and Prussians. This campaign was of such short duration that there was not sufficient time for the experience gained in the use of cavalry to be utilized while the war lasted, but when the war was over, both sides having bought their experience, set to work to reorganize their systems, and the course pursued by the Prussians after this campaign, in largely increasing their cavalry, was fully justified by the advantages reaped in the war with France in 1870.

At the close of the Franco-German War the attention of the whole of Europe was called to the successful use of the German cavalry during the campaign, more especially the advanced duties, when at times sixty miles in breadth and fifty in advance of the army were covered by the cavalry.

In England, after the termination of this war, many German military

works of great value were translated and published, the battle-fields in France were visited and described, every movement of both armies, strategical and tactical, was studied. All this tended to draw our attention to the extended use of the cavalry arm in future campaigns, and the shortcomings of our own system were carefully scrutinized. The movements of our drill-book were simplified, the careful training of our men in shooting was more fully recognized, and the teaching of advanced cavalry duties, reconnaissance, outpost and dismounted work were gone into most thoroughly—in such a manner that I may confidently appeal to those officers who have the best opportunities of forming an opinion, whether our cavalry does not bear comparison now with what is being done in other armies, and in these matters is advancing in a satisfactory manner.

While all this good work has been going on (and I would be the last to say one word that might seem to depreciate its value), we may perhaps have permitted the action of cavalry on the battle-field to escape from sufficient notice. It is for this reason I will ask your permission to bring before you this subject, believing that, the opinions of all branches of the Service being brought to bear upon it, considerable advantage may be obtained.

It will be my endeavor to show, not by my own arguments, but by quotations from others, that cavalry still has an important part to take on the battle-field, and far from its duties ending when armies come in contact, that it is still reserved to them, as has been the case before to decide, perhaps by only one charge, the issue of a whole campaign. Prince Kraft, in his letters on cavalry says: "The battle of Mars-la-Tour, won by the bold employment of cavalry, made possible the blockade of Metz, and afterwards the surrender of the whole of Bazaine's army. So it may be said, without exaggeration, that the charge of Bredow's six squadrons on that day was the turning point of the Franco-German campaign."

Colonel Home in his "*Précis of Modern Tactics*" says, "The action of cavalry on the actual battle-field is by no means a thing of the past. The use of cavalry with skill at the right moment and in the right numbers has always been considered one of the most difficult problems in War. Modern arms have increased this difficulty manifold, but to say the day of cavalry on the field of battle is past is merely another way of saying that the knowledge of how it should be used is wanting."

Cavalry is apportioned to an army in two capacities: (1) Divisional cavalry, that is (if possible) a regiment or as many squadrons as can be spared, attached to each infantry division, acting under the orders of the general of the division; (2) the cavalry division, that is a large body of cavalry composed of several brigades, an independent body having its own commander.

On the march the division cavalry covers the head and flanks of its own division; on the field of battle it will be as near as possible to its division, in the most sheltered spot that can be found: in the early part of the battle it would be kept as much in reserve as possible, echeloned in rear of one flank of its own infantry. It would remain there until the artillery and musketry had effected their work, and the enemy's ranks had become

thinned and shaken. Then when his infantry become tired and exhausted, under cover of the smoke the cavalry may be further advanced.

Prince Kraft says: "At Sedan the divisional cavalry were employed during the battle, charging by single squadrons, patrolling and reconnoitring to obtain information of the enemy and the ground. Every infantry body is accompanied by patrols, however small."

An instance of the too early employment of cavalry in a battle occurred at Waterloo, when Napoleon at the commencement launched his cavalry into the fight. The result was that, although it far outnumbered the English at first, it became so reduced, depressed, and worn out, that it was unable afterwards to offer full resistance to the British squadrons, who were comparatively fresh. Wellington, on the contrary, after his first successes, kept his cavalry, as much as possible, in reserve.

The field of battle itself shows the proper situation of cavalry, but the divisional cavalry on the defensive side must always be at hand to fall upon the flank of the enemy's infantry when in extended order, while that of the attacking side must be equally at hand to prevent the flanks of its own infantry being so attacked.

In discussing the action of divisional cavalry, the most advantageous time for its assisting in the combat must be considered.

At what moment, if any, can infantry be attacked by cavalry?

When opposed to a force acting on the defensive, divisional cavalry has its operations limited, and probably in the earlier part of an engagement, confined to watching, and, if possible, guarding the flanks of its own attacking infantry from surprise.

It is the cavalry of the defender's side that has the greatest opportunities. In both cases, however, a rule must be made not to attack infantry when it has taken up a favorable position, or before its ranks have been shaken by artillery or musketry.

Prince Kraft in speaking of Mars-la-Tour says: "This same day took place a series of cavalry charges of greater or less importance, which all showed practically to the cavalry the limits of their effective action against infantry. The advancing infantry were brought to a stand, infantry who gave way were ridden down, but where the cavalry attacked infantry intact, the cavalry were unable to prevail."

The precision of modern fire-arms has necessitated great changes in infantry tactics. To advance against the murderous fire of the present rifle, infantry is compelled to adopt scattered formations in small lines, and to move forward with sudden rushes. All this lends itself to the attacks of an active cavalry.

When these infantry attacks take place it may be presumed that they have already been under arms some hours, have marched some distance, and been exposed to considerable loss from artillery and musketry fire. Their advance to extended formation will have commenced at about 1000 yards or earlier. By this time the squadrons opposing them will have been brought to a more advanced position, to the nearest point to their flank where cover is afforded, and to carry this out successfully requires skilful leading. Files must be extended, and short rushes made with small bodies,

say half a troop, if over exposed ground, into sheltered places. It is true that cavalry cannot hide themselves over exposed ground as infantry can, but they have one advantage that nothing can deprive them of rapidity of motion, and the distance that would take them, say ten seconds to traverse, viz., 150 yards, would take infantry a minute.

Prince Kraft writes: "No battle-field is a *tabula rasa*, in the most exposed country there are depressions. If strong skirmishing lines of infantry can advance directly over a country devoid of cover, cavalry can undoubtedly do the like if by making use of the lie of the ground they can gain the enemy's flank. A skilled cavalry leader will thus undoubtedly find an opportunity to get close to the enemy."

Having arrived at this more advanced position, say from 500 to 1000 yards, according to the formation of the ground, the nearer the better, the most favorable moment to assail the flanks of the attacking infantry would probably be immediately before the last halt of the fighting line and before the main body had reinforced them, as they are preparing for their last united rush and as their supports are doubling up to join them. At this moment the men would be to some extent out of breath, their attention would be fixed on the point about to be attacked, and their flanks would be neglected.

Cavalry should then descend upon them at the utmost speed that can be exacted from the horses, with a good interval from knee to knee. If there is only one squadron, one troop should take the flank of the fighting line, while the other throws itself upon the support. As the distance to be covered in the open will probably be not more than from 200 to 400 yards they will be exposed to fire, saying none of the ground is undulating, for fifteen to thirty seconds when at full speed. As they close on the infantry neither the supports or those in rear of them, or their artillery, will dare to fire on account of their own men. If the infantry run to get into small squares, as is most likely, the cavalry must endeavor to catch them before they assemble. If they get together, it may be too late for the cavalry to stop, they must then throw themselves upon them and trust to the supporting squadron to complete the attack.

Although it is rare that a battle-field is on such ground that there are no undulations to afford shelter for cavalry in an advanced position, this may be the case, and if so, the enemy's infantry attack must be allowed to take place, but even then by cavalry showing itself on the flanks for a moment, infantry would get together and afford a better mark for fire, and the progress of the attack would be delayed. The very appearance of cavalry frequently frightens infantry into masses. If the ground was too much exposed for the charge, men might be dismounted, with their carbines, at a safe distance, to assist the infantry. If mounted infantry were at hand they would be utilized in the same way and the machine-guns of the cavalry would also pour in their volleys.

If the enemy's attack is successful, cavalry must then advance on their flanks, and take its chance, and if necessary sacrifice itself to give its own infantry time to rally. If it is unsuccessful the cavalry must be ready to take every favorable opportunity of molesting its broken ranks.

Speaking of Mars-la-Tour, Prince Kraft says: "During the battle a German infantry brigade was forced to retire with heavy loss, and ran some danger of being annihilated by the pursuing enemy. But the 1st Dragoons of the Guards threw themselves on the pursuers. The enemy's infantry massed round the eagles and ceased to press on, while the thinned ranks of our infantry were able to rally and our guns were saved and brought into position. The losses were heavy; half a regiment of cavalry (250 horses) were sacrificed in order to save a brigade."

At Waterloo a French division of infantry fled before three regiments of dragoons (the Union brigade). The Royal Dragoons and the Enniskillens in first line, Scots Greys on their left rear, the whole under Sir William Ponsonby, were acting in support of the Highland infantry brigade, awaiting the attack of the whole of the 1st French Division under General Alix. The three Scotch regiments threw into them a concentrated fire, and as they were staggered by the shock Ponsonby gave the order to advance. Passing through the Highlanders, the Greys having come up into line, the three regiments charged the leading portion of the French column, which yielded, and those in rear were hurled back. The dragoons having the advantage of the descent of the hill appeared to mow down the mass: the Greys on the left pressed on through the supporting brigade of the French, while the Royals drove back the right, giving no time for fire. Many threw down their arms, while hundreds of prisoners were hurried off to the rear of the line, at the same time the Enniskillens forced their way through the centre, when the remainder of the French division broke and fled.

It may be said that this took place before the introduction of the rifle and is, therefore, no example; but it took place within the range of the weapon then in use, and at that distance it was equally effective. The celebrated charge of Bredow's brigade at Vionville (Mars-la-Tour) also shows what an energetic attack may do.

It had become necessary to demand a sacrifice from the cavalry for the good of the army, to enable Prince Frederick Charles with only 24,000 infantry to hold in check Bazaine's army of 180,000, until his own main body came up.

Bredow's cavalry brigade consisted of six squadrons of the 7th Cuirassiers and the 16th Uhlans. They were ordered to make a breach in the front of the 6th French Army Corps. The six squadrons advanced in column, the Cuirassiers leading, when they received the word to change direction to the right, then to form line, which was done under a heavy fire. The Cuirassiers getting into line first, charged at once, the 16th following in echelon. In a moment, the batteries vomiting flames were reached with a loud hurrah and the gunners cut down at their guns, when the whole brigade, which had now got into one line, charged the long lines of infantry in rear who received them with a heavy fire from their chassepots. These lines, too, were broken through, and the main object of the charge was attained, but carried away by the ardor of the combat they charged and took the mitrailleuses, when the French cuirassiers, with a dragoon brigade in support, came down upon them and compelled them to fall back. This they did, having to force their way back through the enemy's masses of infantry

with enormous loss. The object, however, was gained and the attack of the French corps checked and never resumed.

The cavalry division covers the advance of the whole army and is a day or two in front of it. It conceals and guards the army while finding out the movements of the enemy. It collects information and is also used with horse artillery on great enterprises on the enemy's communications. Having finished the reconnaissance and covering the army on the day of battle, it falls back as the two opposing sides come into contact, and awaits further orders. On the battle-field it should be placed so as to suffer as little loss as possible—as a rule in rear of the flanks. How far must depend on the formation of the ground; if shelter is to be obtained, the nearer the front the better. If not, then some 2000 yards in rear of one flank would seem advisable. Its duties are to guard the exposed flank or flanks and rear of the army, while it watches the cavalry of the enemy. If within range of artillery, it should be kept on the move from front to rear. Its strength should not be wasted or frittered away on doubtful enterprises, as it may be required for some decisive blow, in pursuit, or in covering the retreat.

Prince Kraft, speaking of the battle of St. Privat, says: "On the 18th of August the gigantic fight of St. Privat took place. The cavalry divisions were held back in reserve, but the divisional cavalry took an active part. During the battle a squadron of hussars advanced and sent information of the enemy making a flank movement."

He also says: "At Sedan the cavalry division was kept in reserve."

The massing of artillery at the commencement of a battle must expose a long line with some weak spot to attack. If protected by cavalry then probably a cavalry combat will ensue.

Prince Kraft says: "The action of the masses of German cavalry at Mars-la-Tour excited wonder and admiration; they surprised the enemy's cavalry when in bivouac, they met and surrounded the hostile infantry in a threatening manner, and thus 8000 cavalry occupied 65,000 infantry until the Prussian infantry came up. The cavalry made no charges which could not have been successful, but carried out their task of occupying the enemy almost without loss. In the old days these squadrons would have charged and ridden down the infantry. The change is the result of the improvement in fire-arms."

During the early stages of a battle advanced parties under officers selected for the purpose, must be kept out from the cavalry division to watch the enemy's movements, and the information they should be able to afford should be invaluable to the general-in-chief. An engagement with the enemy's cavalry should not be sought, unless they are much weaker, but should the necessity arise the ground should be reconnoitred and every advantage of position taken to insure success.

The attack being determined on, the preparation for it should be carried out rapidly. Echelon movements have many advantages. They favor the formation of oblique lines, they also insure in a charge direct to the front, the bringing up of squadron after squadron in support. The attack of Vivian's Hussar Brigade upon the French reserves at Waterloo gives a brilliant illustration of this, and has been termed by Siborne the "Crisis of

Waterloo." This celebrated charge, intended to be in line, became virtually a charge in echelon of squadrons, in consequence of the rapid pace of the head of the column.

The movement of cavalry must be rapid and unexpected and bear the character of determined confidence ; an effort should be made by manœuvring to come suddenly on the enemy's flank. A gentle declivity for the final charge must be sought. The rapid, vigorous and determined charge in line on to cavalry, riding knee to knee is what is required." The charge to be made effectual, the horses must be brought up in wind, the gallop must not be begun too early, when begun it must gradually be increased to a fast gallop, the final charge, for the last sixty yards, made with every horse extended. " Nothing then must be left to excite the spirit of enthusiasm, even to ferocity, then, and then only, the ' cheer ' to be raised."

At Waterloo the charge of the Heavy Brigade, the 1st and 2d Life Guards and King's Dragoon Guards, with the Blues in support, is a good example of a successful attack on cavalry. The French line of cavalry, as it advanced, presented an imposing appearance. They had ascended the brow of the ridge when a vigorous fire from Ross' horse artillery was opened on to them. In the next moment their trumpets sounded the charge and they rushed to the attack, and as the cuirassiers approached the British squares the Heavy Brigade dashed into them. The shock was terrific. The right of the Life Guards being thrown forward, came first into collision. The right of the French was suddenly thrown out by coming unexpectedly on to a hollow way, and as they passed it the 2d Life Guards came full speed upon them. The French cuirassiers were driven back and pursued until the English brigade came under infantry fire.

The charge of the Heavy Cavalry Brigade at Balaklava, under General Scarlett, is another good example, when the Russian cavalry, receiving the British charge at a halt, were entirely overthrown.

One of the greatest difficulties after the charge is to know when and how to stop, and it is then that the squadron and troop leaders, well in front of their men, must use all their efforts to carry out the ends of the commander. I think this is a time when a strong whistle, carried by the commanding officer and the squadron leaders, can be used with good effect. Being an unusual sound it would attract attention.

The battle being over, some of the most serious duties of cavalry commence. If the army is victorious the pursuit has immediately to follow. History points out the difficulty in carrying this out. Uncertainty of the victory, or how far it can be counted on, often delays its commencement. Battles are often ended by nightfall, valuable time is lost, and the golden opportunities are past. An active cavalry leader will, however, without further orders, at least follow with his advanced parties, and not lose touch of the enemy. He will soon learn the condition of the enemy and act accordingly, harass his flanks and rear and play upon him with his artillery.

An example of another manner in which cavalry may be employed after a victory can be taken from the Egyptian campaign of 1882. When after the battle of Tel-el-Kebir, by a rapid advance of the cavalry some fifty miles

ahead of the infantry, the capital of the country was captured by the English cavalry division.

If the battle is lost, still greater are the responsibilities of the cavalry. Detached squadrons with scouts must be sent round the flanks to ascertain the strength of the enemy sent in pursuit, every available position must be taken up by the horse artillery and every advantage seized for counter-attack. Above all, accurate information must be obtained for the general-in-chief of the nature of the pursuit in order that he may not harass his main body by falling back further than necessary. This subject, however, is beyond the scope of this paper and is one of study of past campaigns.

Of the action of cavalry in savage warfare the recent campaigns in Africa have given some experience. In the presence of an enemy met with in such enormous numbers as in the desert, cut off from all help, knowing that unless you win you die, it seems to be decided that our infantry must adopt the square as the most suitable formation. In the Zulu War, the cavalry at the Battle of Ulundi was placed inside the square. The experience met with there was exceptional, and from the swarms of savages surrounding the square in all directions, it was considered desirable to keep the 17th Lancers in the centre of it, in order that they should not interfere with the infantry fire, and that when the enemy was repulsed they should be launched out upon them, and this was done with perfect success.

It is, however, contrary to the instincts and traditions of cavalry to be shut up in a square, and, where practicable, I should think cavalry outside a square, even at some distance out of the way of the infantry fire, acting with horse artillery, would very much disturb the attacking bodies of the enemy, and, perhaps, attract away a portion of them, and they could be brought up, when called upon to do so, to carry out the pursuit.

In the first campaign on the east coast of the Soudan, on the advance to El Teb and afterwards to Tokar, squadrons were sent in front and on the flanks of the square with scouts thrown out to feel the way and obtain information, while the main body of the cavalry was echeloned on the rear and flank opposite an angle of the square, in the most suitable manner, to avoid any interference with its fire. During the action it remained in this position until after the first attack on the square, when it moved away past the square on the outward flank and acted on the enemy's rear and engaged their reserves until the action was over. During the desert march in the Nile expedition the 19th Hussars, by its scouting, protected the square and gave it timely notice of the approach of the enemy. In a country where a great deal of bush abounds the effective charge of cavalry on to groups of savages is very much curtailed. The Arabs throw themselves on to the ground behind the prickly bushes, the ranks are opened out as the horses avoid the thorns, and the men get no chance of using their swords, but although much execution is not achieved under these circumstances, the natives have great fear of cavalry and they are prevented from attacking elsewhere. When their attention is thus occupied horse artillery and machine guns might make great havoc amongst them. At the action of Tama where the ground, from the rocks and ravines of the neighboring mountains, was unsuitable for cavalry charges, when one of the infantry

squares was broken, the cavalry advanced and one squadron of the 10th Hussars dismounting, helped to create a favorable diversion by pouring fire into the flanks of the attacking Arabs.

My remarks would, I think, be considered incomplete if I did not touch on the question of cavalry charging squares, as this point is always made very prominent in all discussions on the action of cavalry. I therefore must not pass it by. I will say at once that I think it most undesirable, even under favorable circumstances, that cavalry should charge a formed square of men armed with the breech-loader. At best the gain can be but local and partial, while the loss to the cavalry, an arm so difficult to keep up in numbers, must be disastrous, and it seems to me that if cavalry by its appearance can force infantry to form square, it has done enough, and that the artillery, infantry and machine guns should do the rest. The necessity might, however, arise, and by looking at the past we see its possibility. At Langensalza, two Prussian squares were broken by the Hanoverian cavalry and the major part taken prisoners. We have only to turn to the recent campaigns in Egypt to see the effect of determined rushes of men intending to succeed, charging on to squares carefully formed on ground affording no shelter, with an enormous amount of fire being poured upon them. It will be said that these men were fanatics, but our cavalry, too, have been and will be fanatics in a charge, and I still think if the necessity recurs that an attack properly conducted on favorable ground, one troop charging on the corner of a square followed by another at double distance, others in echelon on both flanks immediately following, the whole charging with the greatest impetuosity, intending to win, will break down any square that Englishmen are likely to meet with.

If we look back again on the past we will find many instances of British cavalry not being called upon in vain to make a sacrifice. At Talavera the 23d Light Dragoons supported by the 1st Hussars of the German Legion advanced against the French squares. In their impetuous rush they came upon a hollow cleft covered with long grass eight feet deep and eighteen feet broad. Too late to pull up, the foremost rode headlong into it, some tumbled in, others over it, some rode boldly at it and gained the other side. Still they went on, swept past the infantry columns and fell upon a brigade of French chasseurs.

At Balaklava 670 British horsemen were launched against an entire wing of the Russian Army. The brigade at first in two lines, the 11th Hussars, 17th Lancers, and 13th Light Dragoons followed by the 4th Light Dragoons and 8th Hussars advanced down a gradual descent of three-quarters of a mile, the Russian guns vomiting shell and shot upon them, one battery bearing on their right, another on their left, and all the intermediate ground covered with riflemen. The guns were charged and forced through, the forces drawn up in rear were overpowered. They then had to turn, and retreating up hill ran through the same gauntlet.

In the Sikh War, at the Battle of Ferozeshah, the 3d Light Dragoons charged the enemy's entrenchments at a point defended by some of their heaviest batteries. When within 250 yards the regiment moved at speed under a destructive fire of grape and musketry, and pressing forward at

the charge entered the enemy's camp and captured the whole of the batteries.

Cavalry attacks have been made with success after dark and the advantage, of course, is gained of obviating opposing fire. Prince Kraft mentions that after the battle of Mars-la-Tour the cavalry division reinforced by the divisional cavalry rode forward to complete the advantages gained. It was almost night and fault has been found with making the attack in the dark. If the ground is well-known a night attack may be advisable. While criticising it, we have to think of the feelings of a half defeated army about to bivouac, being attacked by unknown forces in the dark. In this case, at Vionville, the enemy did not wait for a second, but withdrew and abandoned the whole field of battle.

Prince Kraft quotes the attack of Blücher at Gross-Gorchen and a cavalry attack at Soen.

During the first Egyptian campaign the Life Guards made an attack by moonlight at Kassassin.

I have now, I think, touched lightly on some of the most important cavalry duties on a campaign. In some points perhaps these remarks may appear contradictory. How to combine keeping cavalry in reserve for any great action it may be called upon to perform while using it unsparingly to assist on the battle-field, if the necessity arises. It may, however, be noticed, that much as they may be criticised, few cavalry commanders have been severely blamed when they have thought it best to take the bolder course.

To insure cavalry the power of carrying out its duties successfully in War, organization and practice in peace is most essential. Infantry may suddenly be increased, without much deranging its action in the field, but cavalry cannot be hurried into an increased augmentation. In tactics, simplicity in every evolution and rapidity in execution are the most important principles.

This simplicity of drill, I think, might be assisted if our squadrons were divided into four divisions, zuges, or pelotons. When squadrons have forty-eight files in the front rank there might be four of these, while weak regiments with thirty-six files could drill equally as well with three divisions. This system, introduced by the late General Valentine Baker into the English service for a time, and now used by all European countries, was found to work well.

I think the whistle could be carried with advantage by all cavalry officers. For advanced work attention can be drawn by it without being heard at a distance like a bugle. In movements the commanding officers would find it useful to call the attention of leaders to himself, especially in extended or echelon formation.

I have omitted to make much mention of the action of horse artillery combined with cavalry, as it seems beyond the limits of this paper, but it is one to which the cavalry officer's attention requires to be brought most strongly to bear. I would also have wished to have made some remarks on the many advantages to be obtained by having mounted infantry attached to cavalry. I understand that this force would be under the

orders of the cavalry general, and if so, I think a cavalry division well found in horse artillery, with mounted infantry, whether conveyed on horses, or where the country admitted of it, on cars, and accompanied by machine guns on wheels, could act in such an independent manner as to enable it to penetrate far ahead into an enemy's country, or threaten his communications, and be absent from its main body for many days or weeks.

As regards the English cavalry, I think it may be said, without boasting, that the material is excellent. The men are of the best physique, recruited from a good class, and plenty of them to be had. The non-commissioned officers are intelligent and always ready for instruction. The riding compares favorably with cavalry of other nations; certainly far better than any I have ever seen abroad, either German, Russian, or French, and amongst all foreign countries we have the reputation of being the best horsemen in the world, which at all events has a good moral effect.

Our horses are undoubtedly, first-rate, having more quality and greater speed than foreigners. We have in our officers the exact stuff we want. Their very sports and amusements start them with all the makings of cavalry soldiers. But the quickness of eye, the self-confidence and readiness that these sports and games may give require nowadays, more than ever, something beyond this to produce the trained cavalry leader.

Cavalry is an arm of opportunity, and above all others depends greatly on its leaders, but with the chances now available of reading, in every detail, the campaigns of the past, if taken advantage of as is now daily becoming more common, we should produce in the future the best and most accomplished cavalry officers that this country or any other has ever seen.

I will now conclude my remarks in hoping that in the discussion that will follow, the many omissions I have made in this paper will be made good.

TACTICAL USE OF MOUNTED INFANTRY,

BY CAPT. H. R. GALL.

(Reprinted from the Illustrated Naval and Military Magazine, London.)

THE prevailing idea that the next war will witness a still greater revival of the use of cavalry than seen in 1870 has been strengthened by the imposing display of squadrons at the recent manœuvres in Germany and also in France. How to meet the enemy's cavalry and to prevent it from obtaining an advantage at the outset will be a question of the most serious importance to that side which acts on the defensive in the next great war. One drawback to fighting the advanced cavalry of an army with cavalry alone is that it is liable, even when successful, to break up the cavalry divisions and to leave the victors (supposing them to have been vigorously opposed) without that preponderance of the mounted arm, upon which a brilliant success that would be decisive in the subsequent campaign would largely depend. It might be urged that this applies equally to both sides; but the supposition is, that at the outset of a cam-

paign the defending side is the weakest in cavalry, while, at the same time, it is important to stop the enemy's advance and prevent him from seizing the initiative. Under these circumstances, during the first stage of a war, any combination of troops that may be reasonably expected to delay the enemy's advance, without incurring too great a risk of using up the cavalry of the defending side, is deserving of consideration.

To fight cavalry with a mixture of horse and foot soldiers is nothing new. History repeats itself by the adoption in the English army of a combination of the two arms. The objection to mounted infantry has been that it combines the defects of two arms without possessing the highest qualities of either. This idea is entirely a wrong one, for it implies that mounted infantry are sometimes intended to fight on horseback; but mounted infantry are not dragoons. Well trained cavalry and artillery are more likely to succeed, when opposed by cavalry and artillery only, than if they were encountered by a skillful combination of infantry and machine-guns with cavalry and artillery. This combination is easier and involves less loss of mobility than has been generally supposed. For example, the advanced troops of an army might be divided into brigades, each representing a complete tactical unit consisting of

- 2 regiments of light cavalry.
- 2 batteries of horse artillery.
- 1 battalion of mounted infantry.
- 6 machine-guns.
- 100 trained and selected scouts.
- Small-arm ammunition, tool and light baggage carts.

All reconnoitring to be performed by the scouts, who should be carefully trained to acquaint themselves rapidly with minute details of localities.

MOUNTED INFANTRY.—The principal fighting rôle belongs to the infantry, which arm, in order to be able to manœuvre with cavalry, must be superior to it in mobility; the men should ride lighter and be mounted on horses selected for speed and agility, but not intended to deliver a charge. This superior mobility is necessary to enable the infantry, when manœuvring with cavalry, to dismount in time to aid them with their fire. Mounted infantry should never fight except on foot, and should always endeavor to select positions favorable to the development of rifle fire. Dismounted and in action, they should only mount when about to be moved for distances exceeding half a mile. When mounted and manœuvring to get into position their movements should be exceedingly rapid. A dismounted escort should always remain with the horses of those who are fighting. A machine-gun may sometimes form part of the escort, especially in open country favorable to cavalry.

The fighting formations on foot will be those of infantry when acting against cavalry and artillery. Square may be formed to protect the horses if seriously threatened by the enemy's cavalry. Mounted infantry may gallop in open order to within 1200 yards of field guns in action, then dismount and advance in skirmishing order and attack them; they will, of course, always endeavor to attack guns in flank or obliquely. Mounted infantry need not be taught any cavalry drill; they need only be trained to

ride over difficult country and to groom their horses. They should be constantly manœuvred in conjunction with the other arms, and be practised in engaging large bodies of cavalry; they should be taught to ride for the nearest cover, and to reserve their fire until the cavalry are within effective range. The effect of well-directed volleys delivered at short ranges should be constantly impressed on all ranks. Any probable enveloping movements of the enemy's cavalry ought to be forestalled by posting mounted infantry and machine-guns at certain pre-arranged places.

Mounted infantry, presuming that they are good shots, should be constantly impressed with the idea that they ought to have nothing to fear from cavalry.

MACHINE GUNS.—Machine guns should be attached to limbers and thoroughly well-horsed. Their mobility should be amply sufficient to enable them to co-operate with each arm as required. In selecting positions for machine-guns, especially when pushed forward, great attention should be paid to getting as much cover for them as possible. The tactics of the cavalry and artillery will be the same as usual for these arms when co-operating with infantry, or acting alone.

TACTICS OF THE FOUR ARMS COMBINED.—The position of the cavalry and artillery will usually be on the flanks of the infantry, taking care not to advance beyond the support of the latter, unless ordered to do so by the commander of the brigade. In like manner until the enemy's squadrons have been broken up, the artillery should rarely be advanced beyond the protection of the infantry. The cavalry, as a general rule, should not charge until the enemy can also be engaged by the infantry, but should rather be encouraged to manœuvre so as to bring the enemy under the fire of the infantry and machine-guns.

When scouts are out they should be supported by small detachments of mounted infantry. When reconnoitring, the movements of cavalry and artillery are generally restricted to the roads. Mounted infantry, on the other hand, can always dismount, and should act off the roads if necessary. So long as movements are restricted to roads mounted infantry have a great advantage, and ought always to be able to check cavalry whenever the country is enclosed and difficult. Should the country be very open, the formation to meet cavalry and artillery might be as follows :

Infantry in the centre ; first line dismounted.

Supports, or second line, mounted ; in rear of the flanks of the first line.

Third line mounted ; manœuvring on the most exposed flank.

Machine-guns acting with the infantry should unlimber whenever their long range fire is likely to be effective.

The cavalry manœuvring on the least exposed flank should endeavor to regulate their movements by those of the infantry, unless charged by the enemy's cavalry, when the infantry must support them with their fire.

Artillery should come into action wherever it can best co-operate with the other arms. Where machine-guns can go, light carts carrying ammunition and intrenching tools can follow, and the advance of cavalry might frequently be checked by holding villages situated at the junction of main roads. For putting a village into a hasty state of defense, no combination

of troops could be more desirable than mounted infantry and machine-guns, with cavalry and artillery co-operating outside on the flanks.

It has been urged that dragoons can satisfactorily perform the work of mounted infantry. This is not true; dismounted dragoons at best make inferior foot soldiers, and are very little, if at all, superior to their opponent's cavalry, if they dismount to do their heavy fighting on foot. On the other hand, there ought to be no fear of properly trained mounted infantry ever becoming inferior cavalry.

The utility of mounted infantry in wars with savages, especially when long distances have to be traversed in desert countries, is so obviously apparent that it needs no comment.

LIEUTENANT FISKE'S POSITION-INDICATOR.

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IN our issue of February 8th, we described Lieut. Bradley A. Fiske's invention for finding the distance of far away objects. We shall now proceed to describe an invention by the same officer whereby not only is the distance and exact position of a far away object determined, but whereby also any number of guns located at different points and at various distances from that object and from the instrument may be directed upon the object with certainty and dispatch, though enveloped in the impenetrable smoke of battle.

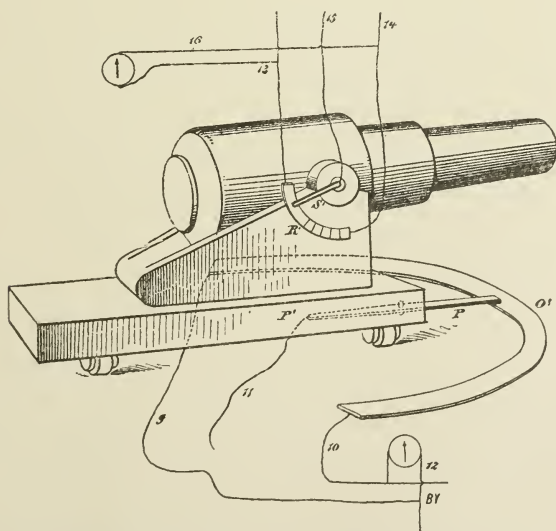


FIG. 1.—RANGING GUNS BY LIEUT. FISKE'S POSITION FINDER.

The invention has a special reference to forts containing a number of guns variously disposed. That a mere distance-finder does not meet the

necessities of a fort will be evident from a glance at Fig. 2, from which it will be seen that the gunners at *C*, *D* and *E* are benefitted little by knowing how far away the enemy's ship is from the instruments at *K* and *L*. The men at each gun must know how far the target is from that gun and in what direction; evidently the knowledge of the direction and distance of the target from *C* will help the gunners at *E* very little.

The present practice in most of the nations of the world is to divide a harbor and adjacent waters into imaginary squares, each square being, say, one hundred yards on a side, and these squares are numbered. Two telescopes are situated at the ends of a known base line, and these telescopes are electrically connected with a protected room, in which is placed a chart representing the fort and the adjacent waters, and carrying two long pointers arranged to sweep over the chart, and pivoted at the points representing the two telescopes. The men at the telescopes direct them continually at the target, and keep the officers at the chart constantly advised as to how their telescopes are pointing. The officers at the chart then point the pointers in the same direction as the telescopes are pointed, and therefore the intersection of the pointers on the chart represents the intersection of the lines of sight of the telescopes, that is, represents the target. The officer then notes the number of squares on which the pointers intersect, and signals to the guns this number. The officer in charge of each gun then consults a table to ascertain how he must lay his gun to fire into that square, and trains and elevates his gun accordingly.

This plan is a fairly good one if the enemy is stationary; but if he is moving it has a number of defects; although even if he is stationary, the squares, of necessity, are too large to admit of very accurate shooting. If the enemy is moving the additional difficulties of the above plan arise from the great time lost between the instant at which the position becomes known to the officers at the chart and the instant at which the gun is finally elevated and trained. Another is, the number of different errors that may arise; these are, first, the error in noting the square at which the pointers intersect; second, the error in signalling the square; third, the error in reading the signal, fourth, the error in consulting the necessary tables; fifth, the error in transmitting the instructions to the men as to how to train and elevate; and sixth, the error in laying the gun according to those instructions, both in azimuth and altitude. To avoid any inaccuracy owing to the time that is lost, Major Watkin, by his method, predicts the position in which the enemy will be, say in half a minute, or a minute in advance, and the guns are got ready to fire when the signal is made that the predicted position has been reached by the enemy's ship. Now this feature of predicting entails several chances of error, necessitates a speed-measuring device, and also necessitates a preconcerted division of the harbor into squares, or otherwise, so that position points can be readily designated.

By the plan here described all these sources of error and delay are avoided, and the men at each gun receive continuously, instantaneously and automatically a signal of what is to be done, given in a way that entails no noise, and which cannot possibly be misunderstood.

The value of the device comes into especial prominence if we remember

that it is absolutely necessary to locate and indicate the position, not only of one, but of several ships. A position indicator should be attached to each group of guns; then these different groups can be concentrated on one ship, or made to fire at different ships according to the judgment of the commanding officer.

Referring to Fig. 2, AB represents a line of the parapet of a fort or other defensive work. C, D and E are guns located in the fort and commanding the area which includes the position of the target F . The object to be attained is to lay all of the guns, C, D, E , correctly upon the target, although the persons in charge of the guns may be unable to see the target and be ignorant of its bearing and distance. For purposes of clearness, in the following description we shall refer only to the necessary operations

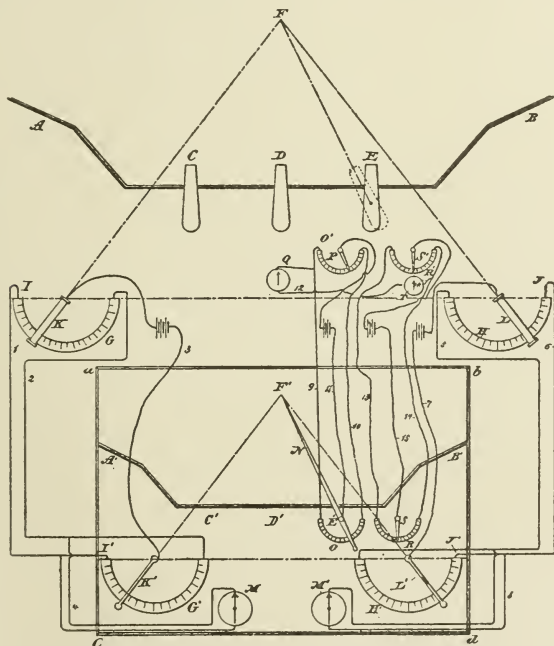


FIG. 2.—LIEUT. FISKE'S POSITION FINDER.

connected with one gun, as E , premising that the same method is followed in connection with every other gun.

G and H are two arcs of conducting material placed symmetrically with respect to a base-line IJ . These arcs are located at stations distant from the positions of the guns, and so situated that a view of the area to be protected by the guns will not be cut off from the stations by smoke, points of land or other obstacles. For this reason it is better that elevated positions should be chosen for the stations.

K and L are two pivoted telescopes, the free ends of which move over the arcs G and H , and constantly maintain electrical contact therewith. These telescopes may be directed upon the target F , which will, therefore, be at the intersection of the two lines of sight of the telescopes.

Located at a station distant both from the guns and from the positions of the arcs GH , and usually at a place safe from the effects of the enemy's fire, there is established another station, which for convenience, we will call a "directing station," in which is a chart or map, represented by the rectangle $abcd$. On this chart the line $A'B'$ represents the line AB of the parapet of the fort, and the points $C'D'E'$ correspond to the centres above which the guns CDE are laterally turned. The chart $abcd$ represents the area within the range of the guns CDE on some definite reduced scale, so that distances taken on the chart represent actual distances. On this chart is drawn a line $I'J'$ corresponding to the base line IJ , and symmetrically disposed with reference to that base line are arcs of conducting material $G'H'$.

K' and L' are pivoted arms similar to the arms KL , the free ends of which pass over and make constant contact with the arcs G' and H' . Arc G' is similar in form and in electrical resistance per unit length to the arc G and the arc H' is likewise similar in the same particular to the arc H . Extending from the extremities of the arc G to the extremities of the arc G' are wires 1 and 2, and extending from the pivoted telescope K to the pivoted arm K' is a wire 3, which includes a battery. Connected in loop from the wires 1 and 2 by a wire 4 is a galvanometer M . It will be evident that the wires 1, 2, 3, 4, the arcs $G'G$, the battery and the galvanometer M are connected in circuit in the form of a Wheatstone bridge, and that the effect of moving the telescope K , for example, to the right on arc G is to increase the resistance in the member 1 of the bridge and decrease it in the member 2, and that the same is true of a similar movement of the arm K' over the arc G' . Therefore if the telescope K be set at a certain position on the arc G , it is simply necessary to set the arm K' to such a position on the arc G' as that the galvanometer M shall show no deflection, when the bridge will, of course, balance, and therefore the angle made by the arm K' to the base line $I'J'$ will be equal to the angle made by the telescope K to the base-line IJ . The extremities of the arc H are connected to the extremities of the arc H' by wires 5 and 6, and the pivots of the telescope L and arm L' are connected by wire 7, which includes a battery.

M' is a galvanometer included in loop 8 from the wires 5 and 6. It will be seen that this arrangement of the two arcs H, H' and circuit connections is the same as that of the arcs G, G' and associated parts, and that therefore when the arm L' is placed at the same angle with reference to the base line $I'J'$ as the telescope L is placed with reference to the base line IJ , the galvanometer M' will show no deflection, and the bridge will balance, as in the preceding case. It follows, therefore, that if the two telescopes K and L be sighted upon the target F by observers located at the telescopes, and if a third observer moves the arms K', L' , and at the same time watches the galvanometers M, M' , he will have placed the arms K', L' at precisely the same angles as the telescopes K, L when both galvanometers show zero reading. Inasmuch as the chart $abcd$ bears a definite proportion to the area which includes the position of the target F , it follows that if the axes of the arms K', L' be prolonged they will intersect at

the position F' , which would represent on the chart the actual position of the target F .

Upon the chart $a b c d$ are pivoted three pointers, only one of which, for convenience, is shown at N , and these pointers are pivoted at the points C' , D' and E' , which, as already stated, correspond to the centres of horizontal motion or train of the guns $C D E$. Consequently, if the pointer N be turned on its pivot, it will correspond to the positions of the gun E when that gun is turned on its pivot.

One arm of the pointer N is long enough to sweep over the area which includes the target, and it is connected to the intersection of other pointers by a slotted pivot, so that it is automatically made to point in the direction of the target. At the gun itself is an arc O' and pointer P' , which, by the principle above explained, always shows how the pointer N is pointing. The distance from the pivot E' to the intersection of the pointers on the chart is marked on the graduated pointer N , and can at once be signalled to the gun E by means of the arc R and R' , according to the same principle.

Or, if desired, the resistance from E' to F' may at once be signalled automatically, according to the same principles. The action of the apparatus is much facilitated, however, if the arcs P and R' are attached to the gun itself, as shown in Fig. 1, so that the gun itself is moved instead of the pointers, and the man in charge of the training of the gun has simply to watch one galvanometer, while the man in charge of the elevating of the gun watches the other galvanometer. It is evident that both of these men can, by keeping the needles of their galvanometer at zero, keep the gun always properly trained and properly elevated, even while it is being loaded, so that the gun will be ready to fire immediately. It is evident that any number of guns, as C and D , may be controlled in the same manner, so that the mere automatic action of the apparatus gives to the men at every gun the most simple and accurate instruction possible as to what they are to do, and that no reading of scales is required.

The *raison d'être* of this invention arises from the fact that the modern guns in Europe are tremendously expensive, some costing \$100,000; that each shot is terribly effective, and that it costs hundreds of dollars to fire each shot. It is, therefore, absolutely necessary that there should be no delay in firing and that each shot should hit the enemy.

LETTERS ON ARTILLERY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by MAJOR W. L. HASKIN, U. S. A.

XI.

GENERAL VON HINDERSIN.

MY examination of the means by which the Prussian artillery made so great an advance between 1866 and 1870, can hardly be said to be complete until I have spoken to you of one man in particular, and of him I shall speak even if by so doing I expose myself to the charge of inconsistency, for I certainly did begin this correspondence with the declaration that I would not examine as to which men, but only as to what facts, may have brought about this advance.

It is clear that in an army such as ours in which discipline is the vital element and even the foundation of existence, an arm could not be brought with this uniformity to such a state of perfection in all its parts in the space of four years, if it had not found at its head a man capable of impressing upon it the only right and proper direction. Had the movement started from below, that is, with the majority of the officers of the army, this advance would have met from the minority,—from a certain number of the minority,—some greater or less resistance which would have prevented it from reaching its greatest development. But the impulse came from the inspector-general himself,—from General von Hindersin; and it was he who was the soul, the master mechanic, of the reform which was brought about in the artillery after 1866.

It is true that he found on all sides those who were disposed to listen, hands ready and willing to be put to work, for every one felt the need of these reforms; but it was Hindersin himself who presided over and who directed them. It is he who brought about that unity in the numerous and divergent ideas and propositions which was the chief and essential thing, and it is he who put activity into the movement and hastened the completion of the transformation of the arm. While higher authority made continuous effort by means of orders and criticisms to give the artillery its proper tactical employment, Hindersin modified the system and course of instruction of the arm so as to make it possible to employ it as it was desired that it should be. He forged and polished the arm while higher authority indicated the manner in which it should be used.

This man placed at the head of the artillery was a most original character. The son of a poor pastor, he had received a complete course of instruction which educated the heart as well as the intellect, but he had been obliged to make his way in life by severe labor amidst great privations. Doubtless it is this labor and these privations which, while giving him an iron will, caused him to turn aside from the pleasures of society and to have

no wish to acquire the polished and polite forms of social life. He took pride even in never appearing, even at balls, in other than ordinary calfskin boots.

During the early part of his military career, which he entered upon soon after the end of the War of Liberation, he served under officers of the old school, and he imitated their rough and unpolished ways. Although his education was very extended (he was strong in mathematics, in physics, and in chemistry, and knew the French and English languages) he made little of the "scientific" attributes of the arm. He placed a much higher value upon knowledge of the tactics and practical skill than upon science. He followed the example of General von Enke, by himself putting in practice his adage "The day has twenty-four hours to devote to the Service." He required much also of others.

He was of a passionate and violent disposition, and his choleric humor was increased by the impatience which consumed him to see his work advance. This great impatience was due to the fact that he was convinced that he would never see old age. His father and all his brothers had died of disease of the heart before reaching the age which he even then had attained, and he himself expected to die from day to day. But before death struck him he was determined to see realized the results of the activity which he had displayed in his position at the head of the arm. Thus there was produced in him a feverish activity which drove all his subordinates to display on their side their greatest zeal.

Many of the reforms were accelerated in this way, although from time to time the too great precipitation with which he acted had injurious effects.

A story is told of him which paints well his character and the fever which consumed him. He had just directed one of his aides to draw up a very extended report, one which presented many difficulties. The young man was looking downcast at the thought of the numerous days and the great trouble the work would cost him. "There is no hurry, you can dine before you set to work," said the general.

As with all men of quick temper he had at bottom a very kind heart. He was full of kindness to men and he loved his numerous family, but he did not believe it worthy of a *militaire* to show that he had a soft heart and it seemed good to him to show roughness and insensibility even towards his family. His oldest son died of a wound received at St. Privat, having languished and suffered several months. He said but this: "The lot of this young man is worthy of envy. A young officer could find no more beautiful death to die than his. With one hand in his mother's he held in the other the iron cross." He said this in the same rough tone with which he addressed words of blame to a subordinate, but a light trembling of the chin betrayed the profound emotion which filled his heart; then his features became more rigid, more severe yet than they were ordinarily, and he proceeded to discuss affairs of Service.

His features were harsh and austere; the face, large and bronzed, was surmounted by a high and wide forehead and surrounded by whiskers of a reddish blonde color. The moustache was of the same shade. He was thickset in figure and of medium height and his bearing was as rigid as his

features. He seldom laughed and had but little taste for pleasantry. When the officers organized an amateur troupe which performed a comedy he was capable of rising in the midst of the play and going away, saying: "This is altogether too foolish." He did not try to make himself popular,—did not care to be loved, as indeed he was not. The great majority of his subordinates feared him. Among themselves the young officers called him "the statue."

However much he chose to give himself tyrannical airs his family knew well how kind his heart really was. I could tell you of many instances in this regard which have been told me or to which I myself have been witness, but these are the details of private life with which the general public can have no concern.

He did not like to bestow commendation. He feared that praise would paralyze the zeal of his subordinates. When he was constrained to give it he preferred to diminish it either in his peroration or in his exordium. Eloquence was by no means his strong point and it could easily happen with him that after having weakened the praise he intended to give in the exordium he still further diminished it in the peroration, leaving out entirely the real praise he meant to bestow. Thus one day in the presence of the corps of officers he said of a professional paper read by a young officer which had really pleased him: "Although I am not absolutely of the same opinion as the reader upon all the points of which he treats, I have nevertheless many reservations to make." The officer felt mortified and asked me shortly afterward whether after such condemnation he should risk going on with his paper, for it was to have been continued at other meetings. I asked Hindersin, when I was alone with him, what had displeased him that he should have expressed himself so strongly against this paper. My question caused him great astonishment, for he really believed that he had greatly praised the young officer. At the succeeding meeting he took the opportunity to remove the false impression given and pressed the young man's hand while expressing his thanks and approbation of his effort. To me personally it has happened in this same way that he has said the rudest things, all the time believing that he was approving my view of the subject under discussion.

Without being, properly speaking, either near-sighted or deaf, Hindersin had not very excellent eyesight, nor was his hearing of the best. Whether through this or through sorrowful experience he had become suspicious, I know not, but he exhibited both towards his subordinates and to the troops a distrust which often showed itself in a most regretable manner, and was the less flattering to those to whom it was directed in that he expressed it always without the least tact. It was his practice not only to inspect troops but to spy upon them, for he believed it always possible for the attempt to be made to make him take the appearance for the reality, and that his orders might not always be obeyed exactly as he had given them. On one occasion he inspected a body of troops placed under my orders at the time of the practice firing. When I wished to execute certain manœuvres he said to me that it was not worth while. "I have seen them," he said, "these eight days, and I am satisfied." I said that I begged

him to pardon me for not reporting to him before, as was my duty, adding that I had not known of his presence. "You could not know," said he, "that I was present. I was in the forest and followed the manœuvres with my glass. I wished to see how you executed them when I was not present."

At another time he had appointed six o'clock in the morning as the hour when he would begin an inspection. It was in the middle of summer and the heat was stifling. From sunrise—that is to say from half past three o'clock—he was upon an eminence in the forest observing by the aid of his glass our preparatory manœuvres, our march to the front, the manner in which we stationed our pieces. He had reached that position from Berlin under the cover of night without being seen by any one. When finally he was discovered in his hiding place I went forward and reported that the brigade had executed the preparatory manœuvre. "You report to me," said he, "only when you are about to open fire. I am not yet here officially. I am here because I choose to take a ride on horseback in the freshness of the morning."

When he inspected he required always that the field works for the batteries should be thrown up during the night, but he did not follow the course of his predecessors. They had been content to see the work begun and then to go away. He remained there all night and at daybreak he caused the troops to open fire from the battery just constructed, so that it could not have been possible to accelerate the construction by any unauthorized means. One of these days of inspection began the evening before at nightfall, and lasted until after noon. He exhibited on these occasions an enormous tenacity and very great control over himself. On the occasion when he made his first inspection as inspector-general at Magdebourg, in 1864, he had his foot bruised and the medical officer forbade his mounting a horse. He continued his work of inspection nevertheless, although enduring very great pain.

A man of such a character inspires a most indefatigable zeal in his subordinates if only by the example he sets them. But whoever had not a conscience entirely clear—whoever had to reproach himself with the least negligence, the least failure in his duty—that one trembled before Hindersin, for he could be sure that he knew well how to discover his shortcomings and would certainly bring them to light.

I cannot deny that at first I did not like to have to do with him, for he inspired me with a sort of inquietude, but when later I had really come to know him and was convinced of his honesty and of the purity of his intentions, I saw him willingly, and knowing the excellence of the fruit hidden within the rough envelope I learned to disregard the husk.

His intentions were invariably honest and pure. He feared nothing so much as to be guilty of showing injustice to any one. I could name one of the officers under his orders whom he deemed incapable, but until the day of his death he hesitated to act in conformity with this belief. In his youth he had had a duel with him and he feared that the repulsion with which he inspired him, the low opinion which he had formed of him, could not but exercise a too strongly marked influence upon his judgment of his capacity.

Although a man of former times, and in some sort of the old school, he welcomed nevertheless all new inventions, every new idea. He welcomed with much zeal and enthusiasm even the novelties which were brought to his knowledge, and when the objections to the novelty were shown him, when it was discussed or objected to, he might even fly into a passion, but he never bore malice to his opponent. Far otherwise. He weighed very carefully all the objections advanced, and if finally convinced of their validity he very quickly dropped the novelty for which he had for a time been so enthusiastic. But if, after having well considered the subject, the new proposition appeared to him worthy of being put in practice, then he set himself to work with that tenacity of which he alone was capable to place it upon a firm foundation.

In order to be able to appreciate, according to their merits, all the new inventions produced within the domain of his arm, he not only reported upon all new inventions, but took part in all the discussions at Berlin upon subjects relating to military science, and he sometimes found, even in the crude ideas of the young officers, something that was valuable and likely to be of permanent service. During the winter he even went so far as to cause periodical meetings of all the general officers and superior officers of artillery in one of the halls of the artillery school at Berlin, and required them to make reports upon the most recent inventions of officers of the practice school, and of the artillery commission for trials and experiments. But he very soon ceased to require this, because he quickly acquired the conviction that these officers were too old to be assembled in recitation halls, and that it was requiring too much intellectual labor from them, but this undertaking was none the less an evident proof of the great zeal which inspired him.

But all his actions, all his decisions were dictated by a dominant sentiment,—his attachment to his monarch,—and this attachment was boundless and showed itself in a profound veneration for the sovereign who was at the head of our armies in the campaign we had made. This veneration is general, is felt by all, and would not constitute a special merit and not even be worthy of special mention if it had not with General von Hindersin, as with few other men, constituted the basis of even the most insignificant of his actions and of his decisions, and if he had not manifested it upon the slightest occasion.

Such a man was well constituted to discover the defects of the arm, to remedy them, and to accomplish the great transformation it has undergone.

In 1864, Hindersin was charged with the direction of the artillery before the redoubts of Düppel. Having brought the siege to a victorious conclusion he was named the second inspector-general of the artillery. At that time the first inspector-general was prevented by sickness from leaving his study, and a few months later was obliged to give up active service. Hindersin took the succession.

During the siege of Düppel the enormous superiority of the rifled pieces over the smooth-bores had been universally recognized, as all who were spectators of those events know very well, but at this time the intro-

duction into our army of rifled pieces had in some way met with a check. Three-fourths of our field pieces were smooth-bores, and but one-fourth were rifled. The rifles were six-pounders. A single experimental battery of four-pounders had taken part in the war. No final determination had been reached upon the adoption of the four-pounder, or upon the increase in the number of rifled pieces, or upon the suppression of the smooth-bores.

The first thing Hindersin resolved to bring about, was the change to rifled pieces exclusively. This is the moment when I was first brought into contact with him. He came to find me. I was very much surprised,—I, a very young field officer,—to receive a visit from a general officer of such rank. My astonishment increased when I heard him say that since his nomination to the position of inspector-general he had been unable to sleep and that I could give him back his repose. Then he told me his thoughts concerning the rifled pieces. He said that they were so superior to the smooth-bores that it was absolutely necessary to have them in our artillery, and then went on to give me his reasons for insisting upon the necessity of being armed with rifled pieces only in case of any future campaign. He said that if he did not do in this respect everything that was in his power to do, and if Prussia, while her field pieces are still three-fourths smooth-bores, were led into a great war with a power armed with rifled pieces only, she would probably lose a decisive battle. But the loss of a decisive battle might bring about the loss or destruction of our country. Then, if he had not done all that lay in his power to procure the adoption of the rifled pieces, if he had been guilty of the least negligence, this negligence, this omission on his part, might cause the loss of his country. This thought weighed like a mountain upon him and took from him his sleep. He, therefore, begged me to obtain for him an audience with His Majesty that he might demonstrate to him the reasons why he deemed it necessary to increase the number of rifled pieces.

What he asked was easy for me to obtain, for it was one of my duties (I was then aide-de-camp) to announce to His Majesty the heads of departments of the army whenever they expressed a desire to see him.

Hindersin made known his views to the supreme chief of the army. Other personages took part in the discussion. They brought forward the reasons why the smooth-bores should not be wholly suppressed. They insisted upon the fact that canister fire with smooth-bores was superior to that with rifles. They cited the fact, as I have said in a preceding letter, that the United States had continued to make one-fourth of its pieces smooth-bore, of a pattern similar to our short 12-pounders. In spite of all objections the arguments of Hindersin prevailed with His Majesty. In June, 1864, the order was issued to introduce as many four-pounder rifled pieces as the foundries were capable of producing.

You know that when the material used is cast-steel, this fabrication requires time. When, therefore, at the end of a little less than two years the event occurred which Hindersin, with his great political sagacity had foreseen, the half only of our smooth-bores had been replaced by rifles. At the end of a year and a half, that is, at the beginning of 1866, each army corps had eight of its sixteen batteries armed with rifled guns. Four batteries

in each were six-pounders and four were four-pounders. As soon as the political complications in 1866, rendered a war with Austria probable, Hindersin resolved to accelerate the transformation of smooth-bore batteries into batteries of rifles.

According to the principles of administration then in force it was considered necessary, in order to make good possible losses, to hold in reserve a certain proportion of the armament, and, in consequence, of the rifled pieces. Hindersin brought up again his argument of a decisive battle. "In this war," said he, "there will be one of them, and if you gain it you will not need to replace the rifled pieces which may have been destroyed, for after that you will not need so much artillery."

He obtained authority to transfer all the rifled pieces of the reserve to the army in the field.

In this way, shortly before the beginning of the campaign, two batteries in addition to the eight already in each army corps were armed with rifled four-pounders, and ten-sixteenths of our field artillery consisted of rifled batteries when the war broke out.

He was not a man to be stopped by any objection when once he had reached a final determination. When the objection was raised that the batteries did not know how to use the new arm he replied: "Let them fire as badly as they can with the new pieces, they will still fire better with them than with the smooth-bores."

There was scarcely time to instruct the batteries even superficially in their use. Each one had one day's practice in firing with shell not charged, then they started for the field of operations.

Hindersin had foreseen rightly. A single decisive battle ended the war. The batteries transformed at the last moment and in such haste did good service. If you follow in the staff history the numbers of the batteries you will find that many of the 15th and 16th batteries of 4-pounders (these were the numbers borne by those which had been transformed just before quitting garrison) distinguished themselves and that in all cases they did not fire worse than the other rifled batteries. Those batteries which did not come into action in 1866, in the different engagements and in the decisive battle, were chiefly, or at least the great majority were, of those armed with smooth-bores. At the termination of the War of 1866 all the batteries which still had smooth-bores were provided with rifled pieces as fast as the funds necessary for the purpose were appropriated.

With that energy which nothing seemed able to daunt, Hindersin immediately devoted himself to the creation of a school of practice for the artillery. At the siege of Düppel he had observed that the artillery practice of the troops armed with the rifled pieces was not nearly so accurate as it should have been according to the statistics furnished by the inventors. Some of these were present by invitation at the siege and wherever they had indicated in a battery the proper manner of using the pieces the practice had immediately shown better results. When he inspected the schools of firing for the first time in 1864 he found that there, also, the troops were far from obtaining the results which the new pieces were believed to be capable of giving.

He was the first to make the results of the firing the chief test as to whether the troops were more or less efficient. While he criticised as usual the evolutions, the movements, the general efficiency of the battery, he required also a table of the results of its target practice to be furnished him and when he received this continued his criticism in saying: "And now, gentlemen, we come to the essential matter—the thing in view of which we are all here, that is to say, the results obtained, the number of hits." Then he would read the results from the table and continue, "According to the information given by the *Prüfungs-Kommission* there shall have been such a percentage of hits, to-day there has been such a percentage." All the officers drew long faces, for the results obtained were always very poor indeed. The general then continued dryly and shortly: "These figures say enough, I will not add a word. We shall have to change all this." By way of consolation he would say confidentially to the chief of this or that battery that none of the other batteries had obtained any more brilliant results, but would add: "Why does the infantry obtain results so much superior to these? Because they have a school of firing. I must have one for the artillery also."

From the moment when he entered upon his duties as inspector-general of the artillery he repeated, as the Roman orator, this *ceterum censeo* at the end of each of his criticisms, in each of his conversations with the supreme chief of the army: "I must have a school of practice."

And he established one. At the beginning it was not a grand affair. He could not create at once a special corps. To do that new credits must have been opened with the budget and the Chamber of Deputies must vote them. The systematic opposition of the majority at that time prevented further expenditure. This opposition had produced the effect which was then known as "The situation without budget." But this situation did not prevent Hindersin from effecting that which he believed to be absolutely necessary. He created a school of firing composed of officers who volunteered for it. After having insisted upon the necessity for the school, having declared that he was sure that all officers would make voluntary sacrifices to attain that end, he designated the first students of the school of firing. They all responded to his call and themselves sustained the expense necessary for the establishment of the new institution.

Thus was established the first school of firing in imitation of the English school, composed of superior officers already well advanced in years, of young and of old captains, who all with their own hands executed the service of the field and of the siege pieces in order to acquire the skill requisite for their management. But this was still insufficient. It was soon plainly evident, as every artilleryman already knew, that next to the correct service of the piece by the cannoneers the main difficulty lies in the correct observation of the effect of the firing and in knowing how to make the changes necessary to obtain the required range. To learn what to do to vanquish this difficulty it was requisite that they should be exercised as commandants, and in consequence the school of firing must have a special corps of troops. The victorious War of 1866 had put an end to the situation without budget and the Chamber of Deputies again made ap-

propriations. The funds necessary for the creation of a school were given. My preceding letters have shown you that the accuracy with which our artillery now knows how to fire has resulted from the creation of this school which was the personal work of Hindersin. The results obtained in 1870 were brilliant.

After the school had been in operation some time, as I have also mentioned heretofore, the system elaborated in its course, a system based upon clearly defined rules, was introduced throughout the artillery. A certain time had been necessary in which to formulate a definite system, for at the outset an incredible number of propositions and projects had been brought forward, and many mistakes were made before reaching correct decisions.

While requiring firmly that the system finally decided upon should not only be mathematically correct but also simple and easy to comprehend, as it must be if it is to render all the service that is required of it at the moment of danger, Hindersin nevertheless accorded to the school a certain latitude in regard to experiments and allowed it to proceed with them until convinced of their inutility. By following this course, by controlling the precipitation which was natural to him, he gave a strong proof of his good sense, for before actual trial it was impossible to know which of the systems would be found best.

In order to qualify himself for forming a correct judgment, as to the several systems, he passed all the spare time left him from the performance of his other duties at the school of firing. He was seen whole days there, on the practice ground, or in the halls of the school, present at the deliberations, at the regular course, and at the criticisms, always a mute auditor. He disturbed no one, gave no advice, but each day carried a new idea away with him.

After this manner he left full liberty of action to the school for a certain time.

I have already said that only since 1868 has the instruction in firing corresponded to the special construction of the rifled pieces. I ask your attention here simply to the wisdom displayed by Hindersin in leaving the school of firing this time in which to develop, before actually proceeding to modify the rules for practice-firing. By this course he not only formed a certain number of instructors for each regiment but awakened also in the entire corps a general belief in the necessity for a modification of the ancient system. He therefore had to do not only with men ready to obey him but even with men who were in advance of his desires. This went so far that when, at the beginning of the year 1868, the general invited the school of firing and the artillery brigades to submit to him propositions concerning the new mode of proceeding with the firing exercises, these also sent him propositions on the same subject. The propositions and the invitation of the inspector-general crossed each other on the way.

From this time the general required with the most rigorous severity that the batteries should obtain the best possible results at their practice. In his eyes those troops were the best instructed who, being equipped strictly in accordance with the regulations and observing carefully all rules prescribed for the march, traversed great distances most rapidly in order

to arrive upon the supposed field of battle; and those who, in observing the regulations strictly, entered the line of fire and obtained the best results with their firing. Those artillery officers who were not in service during this transition period can hardly do justice to the merits of Hindersin and to his great services. To-day there is scarcely a captain or senior officer who has not followed the course at the school of firing many times and it is difficult to form an idea of the former condition of the arm; of the pedantic, worn-out, stupid method which it was necessary to overturn in adopting a practical and rational system.

You can easily see that this could not be brought about without causing this or that officer to suffer from the somewhat brutal proceedings of the inspector. It is wholly natural that a man so brusque as he was, of a character so suspicious, should antagonize many. It is equally natural that sometimes he wronged one and thought too highly of another. Therefore the troops did not love him; they feared him. But he did not care to be loved. He wished simply to follow while he lived and to bring to a good ending the work which he had made the object of his life.

Hindersin attached great importance to *Kriegspiel*. He caused it to be taught systematically to the students at the school of firing, and afterward made it a part of the regular service of the corps. The play of war is, it is true, but a game. It is always more or less removed from the reality according as he who directs it has more or less practical sense and has had experience in war. But the game certainly teaches one to appreciate the ground, to take its features into account, to read maps, and to study the parts played by the different arms as related to each other.

Artillery officers in the practice of this game have to make the proper use of all the arms, and in that way are taught with the greatest clearness the part that the artillery should take as a part of the whole army. Little by little, without the need of specially stating the fact, they came to see that the artillery could never be other than an auxiliary arm; that the essential condition of its action is based upon its being a part of the grand total of the army. In this way the play of war contributed essentially to extend the circle of ideas of the artillerists and caused the former narrow view of their duties to disappear from among them, in fact, annihilated the old spirit of caste.

Hindersin drew profit from all the new ideas of his subordinates bearing upon improvements in the Service. One autumn, at the time when the manœuvres were ended and the men of the reserve dismissed, so that the batteries could not, being without a sufficient number of men, practice mounted drill, he saw a group of officers and non-commissioned officers riding across the fields. He found that they were examining the ground to seek positions for a supposed plan of combat and to discuss the mode of action proper to adopt in such positions. He immediately elaborated a scheme for making these excursions with a view to making reconnoissances. They became later a branch of the Service.

Since I am treating here only of field artillery I can speak but in an incidental way of the action of Hindersin in the domain of fortress artillery.

It is sufficient that you consider but the single fact that it is he who

created the independent regiments of heavy artillery with battalions of garrison artillery, which, until that time had been merely appendages of the artillery brigades and not in much *répute*. He transformed the character of these troops entirely. Up to that time they had known no other mission, no other end, but to exercise daily upon the bastion, the same steps, the same service of the piece which never changed place. Daily they fired upon the same target, and it was not permitted them to become acquainted with any other part of the fortress which they garrisoned, but that assigned them for their exercises.

Consider the fact that Hindersin caused these troops to simulate siege operations and operations for the defense in the environs of the place, and if you then think it worth while to pass in review all that this change means you will have some idea of the magnitude of the service he rendered and of the amount of credit due him for bringing it about.

It was in 1869 that, upon the motion of Hindersin, the first extensive siege and defense exercises took place. At that time these manœuvres were scarcely fully sketched out; they were in some sort just coming into existence. Now they form a whole system. In no regiment of heavy artillery is the annual course of instruction thought to be complete until the exercises appertaining to the siege and defense of the place have crowned it. And before Hindersin the thing was entirely ignored. It is he who first felt the need of these exercises, he who created them.

Consider also the following facts:

It is just at this time that the work of replacing all the old smooth-bore pieces, except those to be kept for flank defense, was commenced. The material to be changed was enormous. This material, for no other reason than that it was there, by its enormous mass offered a resistance very difficult to overcome.

At the same period were transformed all the artillery regulations without exception, as well those of the garrison as of the field artillery.

Hindersin controlled each word, each syllable. He caused the rules they contained to be put into actual practice before approving them.

Thus you may obtain some idea of the consuming activity which this man displayed in the course of the seven or eight years in which he was at the head of the artillery.

"No one is happy before death," said one of the Grecian sages. Hindersin is dead and now it is permitted to say of him that he was one of the mortals most fortunate. His life, the influence that he exercised, the work he undertook, his end, are worthy of envy. He had no other thought, no other occupation, than the improvement of the artillery. In the War of 1870-71 this artillery, brought to perfection by him, was put to the proof. It stood it with full success. The services it rendered were so numerous and so great that the renown of them was world-wide, and it achieved an enviable place among the other arms. Hindersin could say with a sentiment of profound satisfaction that this success was his work.

It was given him to see the fruits of his labors and when the year 1871, the year of the victory, came to an end, he went to his rest, that is to say, he died.

He had the presentiment, that he would die of disease of the heart. He did not deceive himself. One day in taking leave of one who had passed the evening with him he said : " The next time you enter my door it will be to assist at my funeral." His prediction was realized. Eight days later we bore him to his last resting place.

He died on the 23d day of January, 1872.

LETTERS ON INFANTRY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by LIEUT. ODON GUROVITS, 11th U. S. Infantry.

IX.

THE INSPECTION OF A BATTALION.

YOU are wrong to reproach me because I find so much to object to in our method of leading the battalion and so little in that of leading the company ; and I am still more opposed to your forming the opinion that by so doing I encourage the presumption of the junior and subaltern officers towards their battalion commanders. You very properly refer to the fact that the battalion commanders at some former time were company officers. Therefore if I find fault with the usual instruction of the battalion, it is not intended as a reflection on the individual battalion commander. Neither can it tend to lessen their authority over juniors, as the battalion commanders must be at least as well informed and efficient as their juniors are ; otherwise they would never have been promoted to be battalion commanders, nor would they ever have continued as captains. To this add also longer experience.

When I refer to these very common mistakes, it is only to call attention to the fact that it is far more difficult to prepare a battalion for field service than a company.

It is true the latter requires more time, application, and diligence, still the former is in itself more difficult, if at all possible, of being entirely mastered in the available time. In order to instruct a company and make it efficient, the requirements are : good judgment, knowledge of the duties of a captain, honor, diligence, and conscientious and faithful performance of duty. These are, however, not sufficient for the battalion commander. There is a certain amount of talent or natural aptness also necessary. He must divide judiciously the available time and make the best use of it.

We have therefore to inquire whether there exist any means by which we can remove the evils mentioned.

The many attempts to counteract these evils prove that others were also aware of their existence although they never obtained official recognition.

The old method of executing at battalion drill nothing but elementary tactical movements in their most rigid form, viz.: to restrict instruction to changes of front, manual of arms, formation of columns, wheelings, deploy-

ments, marching to the front or obliquely, with a very limited skirmish drill and the latter only when the entire battalion was formed, and, finally, to lay the most importance to a well-executed stiff parade march—this has all been abandoned by us as early as the middle of this century. The battalion commander was permitted, after presenting the battalion at the close of their drill, to execute movements of their own conception without regard to the regulations.

This gave the field officers something to ponder over and much that was new and good grew out of it. When a battalion commander presented an entirely new idea, he was considered at least original although his idea was not always regarded as a practical one.

But this very soon led to excesses.

Each one wanted to discover something new and kept his discovery a profound secret until the inspection disclosed it; after which he again would rack his brains for the next year so as to be able to show something absolutely new at the next yearly inspection. One then could see the most absurd ideas, amongst which the chronic “river,” outlined by a few men and sometimes placed in the middle of the drill ground and sometimes at the brow of a hill, was the least amazing, etc. Owing to the disorder which was one of the characteristics of such experiments these movements were named “Turkish manœuvres” or, shortly, “Turks.” The result of this allowing every battalion commander to show his “Turk” in the presence of his superiors, was to affect very seriously the authority of the regulations; and every one believed that thereafter, in action, the regulations would be disregarded and violated more than ever. The precision of tactical movements was attacked and naturally the discipline suffered much therefrom.

The exclamation of a noted old drill-master which had its origin from that time, viz.: “The parade march, gentlemen, is like the art of glass painting, an art which has been lost,” refers to this evil in a somewhat original manner.

In the course of a few years the best authorities commenced to work against the tendency to such irregularities, and insisted that on the occasion of such “Turks” only movements that appear in the regulations should be executed.

The use of the company column in connection with fighting formation in dispersed order was gradually brought into vogue by modifying clauses of the original regulations.

After the experience of the campaigns of 1870-71 it was again permitted to practically illustrate new ideas on the drill ground. The main problem now to be solved was how to advance to the attack over ground within the effective fire of an enemy. The most wonderful methods were shown—sometimes a square of 300 steps on a side of the drill ground seemed to be strewn with files of two men each; immediately the thought struck the observer that the entire field represented a systematic panic. Again the battalions were seen to run until the men were completely exhausted, the men then fell down and fired in such a state of excitement that would cause any one to doubt whether even a single shot fired would hit or not; or, skirmishers were seen running in swarms, firing while at a run, the piece held at the

hip horizontally without aim. An unlimited literature full of propositions confused the heads of the studious officers, who finally did not know what was written in the regulations or what they had read in military pamphlets.

The new edition of regulations, dated March 1, 1876, put an end to this unsettled condition of affairs. The 4th and 5th parts of these regulations are sufficient for all the requirements of war and permit, as already remarked once before, to lead the infantry anywhere in such a manner as the ground and the stage of the fight demands on account of their great elasticity and flexibility.

How, then, can one avoid, after any prolonged period of peace, returning to rigidity and placing the main stress of instruction upon the paragraphs of the 3d part?

I shall now speak of the day of inspection, since our men will be instructed and drilled according to the manner in which they are to be inspected. We have just reason to be pleased that the discipline of our army is yet such as to accomplish these results. The inspection of a battalion is generally so conducted that, after a formation for parade and parade march, a part of the time is devoted to the 3d and 4th parts of the regulations. The inspecting superior usually designates what he desires to see of the 3d part and then leaves it to the battalion commander to represent an engagement according to the 4th part, unless the inspecting superior prefers to leave both entirely to the judgment of the battalion commander. As a consequence, in the 2d part of the inspection, usually called fighting drill, a battalion commander must endeavor to show how he thinks a battalion would appear in action at greatest advantage. Therefore he insists that not a single skirmisher walks or acts differently from what he thinks to be right. Naturally, then, his fighting drill (his "modified Turk") is beforehand carefully divided into phases well discussed with his officers, and he will endeavor to prevent the least deviation from his prearranged plan, because a deviation would injure his tableaux.

Because of this pre-arrangement of every phase of the intended manœuvre the drill results in a theatre show. These show drills become more like reality—the less the battalion commander knows of what condition is going to make its appearance next. The desire on the part of the battalion commander to prevent all possible departures from his plan at the battalion drill forces the battalion commander to move around frequently where he never could be in action.

All this has the effect of destroying the prompt decision and action of the sub-leaders and it is therefore to be avoided, notwithstanding that it has something in its favor, viz.: it reveals to the battalion how the commander wishes it to move in battle and for the same reason he is anxious not to subject himself to unfavorable criticism. Add to this, that such drills in fighting tactics, when left entirely to the battalion commander, very often lead to impossible conditions which, when we consider the limited power of locomotion of the infantry, would frequently lead to an unwarranted consumption of time and physical force of the men. This has more especial reference to the naturally strong desire to lay particular stress on the results of attacks on the flanks. Thus, should a battalion commander desire to

demonstrate the issue of a flank attack made by a company previously designated, he must take the necessary precaution when about 2000 meters from the object, since the movement would be an impossible one if made while exposed to the fire of the enemy; further the drill ground must offer the required space. The consequence of this is, that, at least half an hour more time is required on account of the greater distance gone over and also more time is consumed in covering a certain distance where the advancing is made by "rushes" while exposed to the fire of the enemy.

Such illustrations of a flank attack are very seldom successful—either it arrives too late, after the main frontal attack has taken place, or too soon.

In both cases one of the two, the frontal attacking party or the flank attacking party, must remain stationary for a certain time exposed to the enemy's fire to such an extent that it would certainly result in defeat. This is evident since the infantry cannot, like the cavalry, take the next increased gait and so avoid the risks due to faulty calculations of time. Only one form of attack combined with a flank attack can be demonstrated at drill without loss of time and it has been sometimes ordered by one of our general officers. He at the start ordered the skirmishers of the company designated to execute the flanking movement, to take position at right angles in the skirmish line of the frontal attack and then ordered the advance against the enemy. Thus the skirmishers of the flanking company advanced in column of files against the enemy on the exterior side next to the company column. I cannot imagine how that officer could ever conceive of an enemy who would tolerate such an attack, especially as I had the opportunity of witnessing him attack enemies who did not manifest such an amount of good nature.

It is true I violate the principle: "*De mortuis nil nisi bene*," by calling your attention to this, but I wish to furnish you an example of how far the gift of discovery sometimes forgets, as even to forget Clausewitz's quotation already once mentioned, viz.: "In war everything is simple, but the simple is difficult."

As soon as I became commander of a division I at once endeavored to abolish within my sphere the evils mentioned by inspecting the battalions accordingly. After several trials, which failed on account of the battalion commanders going too far in their zeal, I adopted a method which proved itself an efficient one during years of practical experience. It proved also that our battalion commanders were very able and efficient in instructing their battalions and that only the manner of inspecting up to that time caused them not to instruct more properly. As soon as my ideas were fully understood I had the pleasure of seeing them improved upon by these gentlemen. Of course this was natural and due mainly to the fact that they had served longer with the infantry arm and had experienced more in detail either as captains or as general staff officers.

Then I commenced to learn from my inferiors.

I shall now describe to you the method of making my battalion inspection because I consider it the proper solution of the problem. You may adopt it if you choose, or disapprove of it.

I now shall give you the results of my experience. I commenced my

battalion inspection like any other inspection, with a formation for parade and next a parade march. I attach great importance to this, since when forming for parade one can judge, by observing the bearing of the men, of setting up drill; when executing the parade march, by observing the manner the feet are planted and whether there is any crowding in the ranks, one can judge whether the method and attention to details in instruction have been good or not. A comparison of my observations, when inspecting recruits or companies and when reviewing a parade march, led me to this conclusion. Furthermore, nothing is more indicative as to the treatment the men receive from their officers than the expression of their faces when forming for parade.

Such observations might give a wrong impression, depending upon the time the men were unnecessarily kept waiting in line at attention. In order to prevent such a possibility I always ordered the battalions to stack arms and break ranks, and not to form line until after my arrival. By so doing I could also observe promptness in falling in. It took a little more time, but it reserved the physical strength of the men for the fighting movements.

I will remark further, that after each battalion inspection, I ordered a parade march in some different formation. This I regarded as a reward for the men, and a solemn close of the inspection; I at the same time addressed a few encouraging words to the men.

I never omitted such a reward unless the inspection had been entirely unsatisfactory. Such, however, never was the case, as I at least always found good will and intentions.

The parade in line and marching past in review is also a good opportunity to judge whether the regulations are regarded as supreme authority or not.

After the first parade march I allowed each battalion commander $\frac{1}{2}$ to $\frac{3}{4}$ hour's time to show the movements of the 3d part of our drill regulations, excepting the 16th chapter, which I reserved for myself until I, through the fighting drill, succeeded in mixing up the battalion and companies as much as possible. In $\frac{3}{4}$ hour's time one could ascertain if the movements executed by command of the battalion commander are thoroughly imbued into the minds of the men. 'After a short rest I proceeded to the fighting tactics.

I introduced this by indicating an enemy by a few markers and then giving very elementary problems to the battalion commander. In solving these, however, I allowed none but commands and movements prescribed in the regulations, nor did I allow any one to forget that the movements are to be executed in presence of an enemy.

The captains did not receive any more instructions than was necessary to understand suppositions as to enemy and markers and which would always be obtainable in an engagement. The battalion commander had to remain in his proper place. Should part of the forces be engaged to such an extent that it would in war be impossible to withdraw them, the battalion commander had to accept it as an accomplished fact, and was compelled to make his dispositions accordingly. The manner of firing (volley fire, elevation, fire with two or more sights, number of cartridges to be fired, pauses in firing, individual fire, rapid fire, etc.) and formation (whether swarms, line, column

and which columns) were the subleaders' business, who only were held responsible for their actions, also when to lie down or when to take up double time, etc. All this gave opportunities to give valuable instruction. By reserving to myself the determination of problems I had it in my power to prevent impossible combinations on the drill ground. I also could prevent too much waste of time in executing any single fighting movement which threatened to become too long in the execution. I could then shorten the time required by introducing a new factor into my problem (a cavalry attack or to assume the defensive from the offensive). By constant practice I succeeded in having a battalion solve 3 to 4 problems in $\frac{3}{4}$ of an hour to 1 hour, provided I carefully prepared my problems beforehand. Should the garrison consist of 3 to 5 battalions, I was then enabled to demonstrate in practice before the same field officers and captains from 12 to 20 different examples, and thus touched upon almost every subject of the 4th part.

To make it more plausible I shall give you a number of such problems for example :

1. An isolated battalion attacks an object in front (frequently to save time only the first 500 metres of the attack were executed, sometimes the last 500).

2. An isolated battalion defends a position (intrenchment, redoubt, wood).

3. A battalion acting as advanced guard unexpectedly comes upon the enemy ; or

4. Is surprised by the enemy.

5. The battalion is sent to attack an enemy on the flank and succeeds in gaining the flank unobserved in fighting formation until at 300 metres.

6. The battalion is in the centre or on a wing in the first or second line of a brigade acting on the offensive.

7. Acting as the last reserve in the centre, the battalion is directed to make an attack, *coûte qui coûte*, to insure success when the decisive moment has been reached and then to spur the fighting line into a general charge.

8. Reinforcements to the enemy or an attack on our own flank force the offensive to change to the defensive, or to a retreat and the reverse.

These eight cases permit of more than twenty combinations and these likewise offer many variations, depending upon the drill ground.

The suppositions of an attack of the hostile or of our own cavalry, or that the battalion commander was placed *hors de combat*, present a still larger field of variations. The last condition mentioned, I invariably introduced into the problem when a battalion commander placed himself at the wrong moment within the effective range of the hostile fire, or when the senior captain of the regiment was present and I desired to give him the opportunity of showing that he could handle a battalion with efficiency. In this manner the inspection of a battalion lasted on drill about $2\frac{1}{2}$ hours and it was as much as I could ever accomplish to inspect two battalions a day. If more is attempted it will be impossible for one to pay the proper attention to details. As the twelve battalions of my divisions were stationed : 5 in one garrison, 3 in another, 2 in another, and the remaining 2 in two other garrisons, I was enabled to inspect inside of nine days (one Sunday intervened) all the battalions. To go more into details at inspections was only

possible by shortening the time available for instruction to make available more time than required for the inspection. The afternoons were always taken up by travelling, also by inspecting internal administration and discipline.

One might think it strange that the division commanders did not all inspect in this manner, knowing the same to be efficient. This is, however, caused by the desire to manœuvre the battalions and inspect them in a manner to carry out the views of the commanding general. The officer at the head of an army corps, must necessarily devote less time to each battalion, and therefore he has to leave it to its immediate commander to show its efficiency.

Had what I have described to you been generally known, had all the division commanders inspected in that manner then, with the interest of the Service at heart, I would have just reason to be pleased. I have often heard the opinion expressed that our system of terminating our drill period with an inspection is very objectionable and many pamphlets held this same view. The reason given is that one cannot in a single day or hour of inspection judge a leader and his men justly, and that the fate of a particular leader depends very greatly on that one fortunate or unfortunate day. As a substitute, the system of the French camps of instruction is proposed; here the daily routine of the superiors (as long as the practice season lasts) is such as to keep the junior officers under constant observation. This argument is entirely wrong; because the final decision as to the efficiency of an officer is not formed from that one day of inspection.

There are many opportunities throughout the entire year to observe any officer commanded or commanding, such as the regimental and brigade drills and also the field manœuvres, etc. An officer's method of performing duty can be learned by looking over the record of punishments awarded; here we see his idea of discipline as well as his decisions and actions at times of sudden emergencies; furthermore, a commander who feels confident of himself and his men, is not dependent upon the fortune or misfortune of the inspection day.

The final estimate of an officer is not arrived at in a single year; thus he has opportunities of counteracting any unfavorable impression which he might have made through accident. Should an officer in a camp of instruction, however, be aware of the fact that he was constantly observed, even when superintending the simplest exercises, expecting constant check and criticism, he would never acquire those necessary qualities of promptness and self-reliance.

"No master drops from heaven," everybody commits mistakes at the start. Were it not possible for an officer ever to make a mistake unless he were called to account for it by a superior we could never expect our officers to assume responsibility when the occasion demands. Not to mention other disadvantages, even in this respect, the camps of instruction according to the French system are not preferable to our method of inspecting detachment exercises and manœuvres.

The method suggested by me is perfectly sufficient to enable one to form a proper estimate as to the efficiency of any commander, and it will also

force him to prepare his troops in the manner described, knowing that he will be inspected accordingly. Therefore he will allow to all sub-leaders independence of action and avoid interfering too soon in minor matters, which is out of the question in war and which arises from a natural temptation to personally superintend instruction in the first principles. It requires, however, that the inspecting officer have a certain consideration for the feelings of the inspected, and that he proceed accordingly. Frequently the inspected officer is in a very excited and nervous frame of mind on account of not knowing what movements he may be required to execute, the feeling of being examined, and also on account of the influence that the inspection may have on his future career and reputation. All this is liable to produce with many officers an extreme state of nervousness and uncertainty, both of which bewilder his conception of the military conditions. It is therefore necessary to remove this embarrassment before a judgment as to efficiency is rendered. A jocular expression is the best remedy. I recall the case of a field officer who was generally very self-reliant and efficient, but who, at the beginning of an inspection, became so embarrassed that he gave with trembling voice the first simple commands incorrectly for the parade march.

I rode up to him and whispered to him: "Major, I noticed your battalion at drill repeatedly, it drilled with such perfection that I would, if in your place, not allow myself to again become embarrassed." He looked at me in astonishment, smiled, and from that moment the battalion drilled without a mistake.

LE COMBAT D'ARTILLERIE DANS LA GUERRE DE SIEGE D'APRES LES THEORIES DU GENERAL WIEBE.*

THE German general Von Wiebe, formerly Inspector of Fortress Artillery, has written a pamphlet in which he tries to define the rôle of artillery in the siege of the future. It treats only of the regular siege *à la Vauban*, which methodical operation has lately been condemned by General Von Sauer, who thinks that the only rational way to besiege a fortress is by abrupt [*brusquée*] assault.

Von Wiebe laying down as an axiom that the artillery combat will certainly, in nearly every case, decide the result of the siege, endeavors to solve the question of what pieces are required for the attack and defense of a fortress, where, when, and how to use them.

Modern artillery will give to the modern siege a special character. The heavy guns which are made nowadays are as indispensable for the attack as for the defense of a fortress organized on rational principles, and by their power and facility of working they will play a more important part than they have done in the past.

The principles of the art, however, are the same as in the time of Vauban,

* From the Royal Engineer Journal of March 1st, 1890; being a review of an article in *Revue Militaire de l'Etranger*, December 30, 1888.

and the steps are the same. Investment is first necessary, next the besiegers' artillery on the selected front of attack reduces to silence the opposing guns, so that the work of pushing forward to the assault can be seriously proceeded with.

As on the invention of rifled guns critics apprehended the upset of the equilibrium between attack and defense, so now the *obus torpilles* cause the same cry to be raised, and we hear that it is impossible for a fortress to hold out for any protracted time before these engines of destruction. However, if the like means are in the hands of both besiegers and besieged the relative position of the two parties appears to remain the same as before.

General Brialmont supports Von Wiebe in this view, and says: "One truth which the new school [Von Sauer's] does not take into account is that the fundamental principles of fortification are as invariable as those of strategy, and the progress and armament and tactics only exercises influence in the manner in which these principles are applied.

Such, however, is not the opinion of Von Sauer. He thinks that the new projectiles have so turned the tables on the defenses that the besiegers need no longer go into the delays of a regular siege, for the fortress offers such a favorable field for the development of the full destructive power of modern artillery that the sieges will in future be counted by weeks where months would have been occupied formerly.

Such are the opposing opinions of the time. For ourselves we may be careful to bear in mind that France naturally inclines to the opinion that elaborate fortresses are not to be taken by Von Sauer's rapid manner of attack, for if they were, alas for the £135,000,000 they have spent on their eastern frontier during the last fifteen years, and for the money which is still being provided by yearly credits of immense sums.

Von Wiebe lays down that iron armor in the form of cupolas is necessary in fortresses under the following conditions:

1. In important forts completely isolated, or far from the main defenses, and in which it is necessary to enable a small garrison to resist an enveloping attack.
2. In portions of a fortress where few guns can be mounted, or which are important to stop the advance of the enemy, or prevent him occupying a commanding position. Such are those which block the important lines of communication, which have a good field of fire, or which are near probable points of attack and can take in flank the besieging batteries.
3. To protect flanking pieces which are to be used only at the last stage of the attack, *i. e.*, from the end of the artillery combat to the assault of the breach.

General Brialmont goes further than Von Wiebe in advocating the equipment of iron armor, condemns absolutely the sole use of uncovered guns, and recommends a large use of cupolas for both direct and indirect fire.

It is, however, clear that as armored guns are more costly than unarmored guns, but few of the former could be employed in the place of a larger number of the latter, and thus some risk would be run of losing the artillery combat prematurely by a deficient artillery power, for though guns in cupolas may be expected to have a longer life than guns without armor

to protect them, yet who can say in this age of invention that more powerful explosives than those now used will not shortly nullify the protection given by armor as at present applied. Besides, armor complicates the mechanism of a gun and thus renders a chance putting out of action more probable in the case of an armored than unarmored gun, and in such case irreparable damage may be done to a defender placing much reliance in a few armored points.

We must remember that the days of armor have given way to days of mobility for the fighting men on the battle-field, and the same is happening to our modern war ships; it therefore behooves us to pause before hiding the greater part of the artillery of our fortresses behind armor.

General Von Wiebe divides the rôle of artillery in a siege as follows: *To breach, to demolish, to bombard.*

To *breach* is to open a road for the assaulting columns, *i. e.*, to silence the artillery of the defense and destroy the auxiliaries of the defense, such as obstacles, shelters, etc. The defender resists this by endeavoring by his artillery to prevent the enemy developing his force.

Artillery then fights the battle.

This rôle to breach may be divided into three portions:

1. Operations which precede the artillery combat-period of preparation.
2. The combat itself-period of execution.
3. End of siege-period of completion.

In the period of preparation the artillery assists the field troops to push back the defender from his advanced points. In the period of execution the artillery endeavors to silence the defender's guns and assist the advance of the siege corps by destroying obstacles, shelters, opening trenches, etc. In the period of completion the attack is driven forward and the defense works destroyed, and if there are further defenses in rear intact, the besieger recommences his operations for their reduction.

At the conclusion of this review, which is to be continued in the next number, we append the following paragraph from General Brialmont's book, *Influence du tir Plongeant et des obus Torpilles sur la Fortification, 1886.*

"General Von Sauer's method of attack will be upheld by that numerous body of soldiers who, prizing the offensive beyond all measure, deny that a fortress can stop the march of an army resolute to vanquish all obstacles. This misconception of fortification, arising from an excess of confidence in the means of attack, may conduce to the most sorry results. It is the duty of engineers, more correctly informed of the difficulties that the attack of a fortress offers, to put their generals on their guard against the application of theories which do not take sufficient account of the value of the lives and the blood of their soldiers.

"The time has gone when bodies of troops could be precipitated into a ditch to form a passage way for assaulting columns. No nation, however great its power and military superiority, is justified in thinking that the offensive will always succeed, and that it will never have to sustain a defensive war with the aid of fortified positions."

Military Notes.

NEW GERMAN CAVALRY TACTICS.

IN no arm of the German Service has the improvement been more marked in the last twenty years than in their cavalry. Not only have the ideas regulating their tactical employment broadened out in the most remarkable manner, but the riding of both men and officers, and the improvement in the horses themselves, is so astonishing that German officers who remember the days before 1870 are compelled to confess that the results have exceeded their most sanguine expectations. In 1870, the idea that cavalry could not charge infantry was even with the cavalry themselves an axiom which no one questioned. When on August 16th, at Mars-la-Tour, the First Garde Dragoner, now Queen Victoria's Regiment, were called on to charge, their colonel, who proved his courage amply in the attack which they delivered, objected that to charge infantry under the conditions of the moment meant absolute destruction; and only a few hours before, Bredow, when similarly called on to charge against guns and infantry, replied to the officer who bore the request—for the first summons was a request only, as it came from the officer commanding the 6th Division, and the cavalry was not under his control—that "cavalry cannot charge unshaken infantry." In both cases the result proved they could. In the first charge the dragoons only lost one-third of their number, and Bredow's brigade, the 7th Cuirassiers and 16th Uhlans, about one-half of theirs. With the results of these two charges before them the reformers, foremost amongst whom were Prince Frederic Charles, General Schmidt, and Colonel Kaehler, set to work to upset the axiom, and at the same time to convince the whole army that with the changed conditions cavalry had not only lost but gained in importance as factors in the conduct of a campaign. They showed that not only had their own cavalry brilliantly covered the strategic advance of their armies, but that the enemy in the next war would try to do the same. Basing their argument on the nature of the man, and not on his weapon, they proved that the opportunities of cavalry on the battle-field against shaken infantry would be as great and decisive in the future as they had been in the past: only to seize them cavalry must learn to gallop and manœuvre, and must not stop to question too closely whether the enemy actually are shaken or not, experience having demonstrated that infantry are already deeply shaken morally before they show signs of their condition, visible at the great distances of modern encounters. We have no space here to follow in detail the steps taken to develop the latent power of the arm; but the following account of a regimental and brigade inspection sent us by a correspondent

who has enjoyed exceptional opportunities of seeing the German army at work will show the perfection to which they have arrived. Our correspondent's letter is interesting when read in connection with that of Captain Gall:—"The first thing that struck me on riding down to the ground was the extraordinary precision with which the alignment was taken up—every horse dead square to the front; and when the line was called to attention, every man took up his reins, collected his horse, and sat ready to obey the word of command. This is an important feature, for it is on this that the extraordinary precision with which a manœuvre is commenced depends. Again and again, on subsequent occasions, I saw a whole brigade move off at a trot simultaneously—literally, before the eye could sweep from end to end of the formation. Of the march-past at a walk with which the proceedings commenced, I need only notice that it was neither better nor worse than what we usually see; but the small horses looked altogether overweighted by their riders, and the want of smartness in the turn-out also unfavorably impressed us. But all this was changed when they began to move. After the march past the regiment was drawn up in line of squadron column at close interval. The 'trot' was sounded, and they moved off with absolute precision; and after advancing a couple of hundred yards they opened out by inclining to full intervals. Then they wheeled into half-column of squadrons, and continued the advance in perfect order for about 400 yards, still trotting. Then followed 'front form' and line to the front on the leading squadron, to effect which the rearmost squadron had a considerable gallop. A few more yards to the front to steady them down, and then they broke into column of divisions (*Züge*) to the left, and immediately afterwards the 'gallop' sounded, and away they went at their full gallop of manœuvre of fifteen miles an hour without the slightest opening out: this pace was maintained for about 1200 yards, then the head of the column wheeled to the right, and as soon as the tail of the column passed the wheeling-point, the 'wheel into line' sounded, and the movement was executed with an accuracy I could hardly believe possible. The advance was continued some three hundred yards, and then the 'charge' sounded, and it was delivered almost like a wall; then *mêlée* and rally followed, and the regiment drew up in its original formation of line of squadron columns at close interval. I subsequently measured up the distance covered at the gallop on a large scale-map, and could not make it less than 3000 yards, take it any way I would. The next operation was the debouching from a wood and charging infantry. The regiment, which, I should have mentioned, numbered five squadrons of sixty-two to sixty-five files, trotted off down one of the numerous cuts through the forest which borders the drill-ground, and when all had well disappeared, we heard the 'halt' and 'threes about'—the Germans still work by threes and not by fours—and the next moment the 'gallop' sounded. The regiment came out, not at the gallop, but at the charge: each squadron front formed as it got room, and selecting its own object about 600 yards from the wood, charged down on it at the fullest extended speed of their horses; and then all idea of the little horses being overweighted vanished from my mind. They came on like the fastest rush on a polo-ground, though of course the lines were not so well

closed up as before. I had to confess, infantryman as I am, that even repeaters would have had a poor chance of stopping the rush. Then followed a short halt without dismounting, and then three more long advances, ending with charge and *mêlée* and pursuit, were ridden. None of the advances were less than 2000 yards, and in two out of the three the line was formed after the 'gallop' had been sounded, and not whilst the heads of the columns were still trotting. The charges were beautifully ridden, boot to boot throughout. In only one point could I find an opening for criticism—viz., that the *mêlées* were hardly satisfactory, the men scarcely leaving the ranks, but only making a pretence of doing so. Probably, as it was only an infantry general inspecting them, they thought it safe to try a little 'eye-wash.'

"I must confess, however, that under no circumstances have I ever seen this part of the show as well done in Germany as I used to see the 11th Bengal Lancers do it in India. The day wound up with a gallop-past, for which I have nothing but praise. The squadrons swept by at their full fifteen miles an hour, horses in hand, and that smooth, rhythmical swing of the plumes (they wore plumes that day) which implies a total absence of wasted energy. One might live long at Aldershot and see nothing better. Next day I went down to see the brigade inspection. The brigade turned out two regiments of five squadrons each, the squadrons the same strength as the day before. After the march-past the manœuvring commenced, as the third line of a division in line of squadrons, at close interval, at a trot; and it would be difficult to imagine anything more perfect than the way they changed front and wheeled. There was no trace of raggedness anywhere; they looked just like two squares off a chess-board manœuvring about. Then came a repetition of the gallop to a flank in column of divisions (*Züge*) of the day before. For about 1500 yards this tremendous column, nearly half a mile long, moved with the same precision as the regiment had done. Then they simultaneously wheeled into half-column to the left. Just at this moment, the head of an infantry column emerged from the wood to the right rear, and the general commanding took them for his target. He sounded 'troops about,' which brought them into half-column, right in front, and his gallopers flew. As the leading one reached the right-hand regiment, I heard 'line to the front' sound, and the regiment formed to the front, not at the gallop of manœuvre, but at racing pace, and went straight for the enemy. The three squadrons on the right of the second regiment completed their wheel, which brought them into column, and enabled them to gain the rear of the first regiment, when they again wheeled into line and charged right into the *mêlée* of the first line, and the last two squadrons cantered up and halted as last reserve. I have never seen anything faster or more perfect than the way this attack was delivered. The infantry, of course, had nothing to do with the performance, but were only coming out to drill, and therefore took no notice of the cavalry; but still, had it been an ordinary defile, the cavalry were down on them before 300 men had passed, and under such circumstances that even repeaters could not have given them more than an average of five shots, or 1500 bullets, of which probably not fifteen would have taken serious effect. What would

have become of the infantry then? It is a question which I, as an infantryman, must ask. The remainder of the inspection consisted of two more long advances and charges against a skeleton cavalry, all delivered with the same precision as the day before, and after a critique and final gallop-past we all marched home together, the squadron leaders congratulating each other on having had two such easy days for their horses. And indeed, in comparison to the previous fortnight, they *had* been easy days, for they had had five days a week of from five to six hours a day, and on these two days the last squadron was back in barracks in three and a half hours only. It is difficult to estimate the ground actually covered, but to the drill-ground and back was eight miles, and in the hour and a half's manœuvring they had covered at least twelve more, or twenty in all. During the preceding period they could never have done less than thirty miles, all told. Yet in spite of this the horses were in perfect condition, far superior to what I remember them at similar periods five and six years ago. Going round their stables afterwards, I was simply astounded at the condition of the animals' legs and sinews. Not a sign of overwork was there amongst them, the sick lines being nearly empty. Afterwards, in conversation with the officers who remembered the old pre-'70 days, I was assured that the improvement in the remounts and the way of managing horses had been so marked, that whereas formerly it was difficult to make up one's mind as to which of the horses ought to be cast, because they were all so miserable, nowadays it was difficult to find enough to cast, so few really being literally past work. I could not help thinking that the fact that nowadays they generally drill in field-day order, instead of as formerly in full marching order, probably had a good deal to do with the matter."—*Army and Navy Gazette*.

USE OF CAVALRY ON THE BATTLE FIELD.

In Germany a reaction has set in with regard to the tactical use of cavalry on the field of battle. Some are of opinion that in these days of extended formations the self-reliance of infantry will be shaken in the presence of an overwhelming body of cavalry. The theory of this latest freak appears to be that the loose order of modern infantry formations affords even greater opportunities for cavalry to drive home a charge than in the days of flint-locks and shoulder-to-shoulder manœuvres. It disregards the effect of long range or even medium range fire, which now extends over a zone of 1700 yards in depth, and risks running the gauntlet through a hail of lead twenty times as thick as that which had to be faced before the introduction of breech-loading rifles and smokeless powder. It seems to ignore the greater facilities for taking cover—which in the case of an average shot ought to mean securing a good field of fire—afforded by the loose order of modern infantry tactics; also the diminution of recoil, which is a very marked feature in the new rifles which are now being generally adopted; and builds its hopes of success on the assumption that arms of precision which shoot point-blank up to 500 yards are next door to useless in the hands of the young and untried soldiers who will so largely compose the ranks of the huge armies which are now placed in the field, and that either their training or their stomach for the fight is so defective that, in the pres-

ence of what they must know to be almost certain death if they bolt, these young soldiers will suddenly become paralyzed and unable to empty their magazines at short ranges with a mass of horsemen presenting a front considerably broader than the rifle-butts, which even the very worst shots so seldom fail to ricochet into when firing at third-class ranges at a target representing a single man. But even supposing that the infantry soldiers of the period are so utterly nerveless as to be incapable of firing steadily in extended order in the presence of cavalry, the present attack formations—which no one supposes are intended to be rigidly and blindly adhered to—are all based on the sound principle that the utmost amount of effective fire can at all times be developed by the first line, which is capable at the shortest notice, say two minutes, of being closed up into a solid line two deep. It is important to bear in mind that the front of all units in attack is laid down as being equal to the first line of attack—consisting of firing line, supports and reserves—if in line, and it rests with the commander of that portion of an attacking force which is assailed to decide at any moment whether this welding together of his men is expedient. Here, then, is a shoulder-to-shoulder formation at all times provided for. It is ridiculous to suppose that a mass of cavalry about to deliver a charge over suitable charging ground will not give ample warning of its approach, and two minutes' notice is all that infantry in any stage of the attack ought to require to enable them to assume a formation in which British infantry at least have never been known to quail when opposed to cavalry; and the glorious records of El Bodon and Waterloo show that our allies when fighting alongside of us have been equally staunch and resolute. No one would advocate a return to four-deep squares, the necessity for which was never very apparent, and which, in these days, would mean annihilation by artillery fire; but between line, and two-deep square the difference is only one of frontage, and a long line is capable of developing more fire than a short one. That there is great room for improvement in respect to shooting generally, and especially to the proper adjustment of sights at medium and long ranges, will be readily conceded by all practical soldiers. This defect is capable of being remedied to an almost unlimited extent by careful training and fire discipline, and is now engaging the earnest attention of all thoughtful commanding officers. It is to be hoped that we shall not too blindly follow the Germans in this last craze. We have very properly endeavored to adopt the spirit of their infantry tactics founded upon the experience of a later campaign than that of 1870-71, and have accepted as our model their more doubtful artillery aspirations; but we have not enough cavalry, and what little we have is too valuable—I might add, too thoroughly efficient—to be played with. If called upon to charge *en masse*, our cavalry, whether British or Indian, will readily respond to their leaders; but at present their chief excellence consists in their superior horsemanship, and in the feeling that they are equal to any call that the vicissitudes of a battle-field may make upon them. The formations in which they charge must always depend on the ground and the skill of their commanders to adapt them to the object in view; to attempt to lay down fixed rules for cavalry charges would be fatal to the dash—which is, above all, the true character-

istic of a good cavalry leader. In the face of prevailing continental opinion, it will be wise to manœuvre our squadrons in columns, and it will be desirable to accustom our infantry to the noise and general appearance of a heavy body of cavalry bearing down upon them, and to impress upon them in peace-time that if they only keep steady and fire deliberately and low they have nothing to fear. Napoleon, when in the zenith of his glory, said that there were five things essential to the success of a charge of cavalry *vs.* cavalry: ground, opportunity, pace, cohesion and a reserve. Against infantry, if properly handled, he was of opinion that cavalry had no chance, and were liable to be checked by a handful of bad shots. The charges of French cavalry at Waterloo (which so signally failed) were not ordered by the Emperor. Everything went wrong under him on that day; he was physically worn out. I quote the authority of Napoleon, because the tactics of the last twenty-five years have been a *réchauffé* of his principles. It was Napoleon who said: "Le feu c'est tout; le reste c'est rien." Let us pause and consider before we adopt any tactics that Napoleon did not believe in. If infantry, evacuating a village, issuing from a wood, or debouching from a defile, omit to take ordinary precautions, they will now as formerly be liable to be surprised and overwhelmed by good cavalry. Something might be said regarding the co-operation of mounted infantry and machine guns *vs.* cavalry, but I have already encroached enough on your valuable space. I am, etc.,

H. R. GALL, Capt.

—*Army and Navy Gazette.*

"INFANTRY FIRE-TACTICS OF THE FUTURE"

Is the title of a most interesting paper which reaches us from India, by Major G. F. Young, 24th Punjab Infantry, who has been awarded the silver medal of the United Service Institution of India in a recent prize-medal competition. The essay deserves more than passing notice, more particularly as it may have escaped the attention of those serving out of India. The language is simple, and the conclusions are in most cases borne out by the teachings of experience. No doubt the author's views deserve to be considered as a welcome contribution of a matter which materially affects the fighting efficiency of the Army. Major Young remarks that nothing short of the highest steadiness and discipline will suit the conditions of future warfare, as every increase in rapidity of fire increases the strain on the soldier's nervous system, and every increase in the range of the rifle prolongs the time that strain must be borne, in addition to which every increase in "fire-power" requires an equivalent increase in "fire-control" which has to direct it. This is very true. We of all nations ought to appreciate the immense advantages of "high discipline." Major Young holds that our present form of attack is incompatible with that standard of steadiness and discipline necessitated by the changed aspect of the battle-field. Any form of attack will fail, he argues, in which "at *any* reinforcement a certain vital unit is intermixed." Further, he says emphatically that "the German system will never suit our Army." On this point there may be a diversity of opinion; but the weight of argument is, we believe, on Major Young's side. We cannot expect the German system, which is applicable

to big companies, to work equally well with our small ones. But what, it may be asked, is the "vital unit" which is never to intermix? According to Major Young it is "the *smallest* which is (1) complete in itself, (2) can act independently in all situations, and (3) can prolong such action independently." In other words, it is the company. "You may," he says, "break up double companies, battalions, or brigades; you may shuffle in any way the battalions in a brigade, or the companies in a battalion; but the moment you touch the company you strike straight at the root of all discipline, and with it steadiness. Moreover, the only smaller units, the half-companies and sections, are not true units, nor complete in themselves, nor large enough to act throughout an attack independently without shrinking to nothing. The rôle of the section is as the fire unit, not as the tactical unit. But it may be said of our present mode that it does keep the company intact; no doubt it looks pretty on a parade-ground to see the left half-company coming up just when and where it should do with regard to the right half company; but for real work we want a body which, when it does come up to reinforce, can go into the line anywhere without any consideration of what sections, companies, or battalions it goes in between." Though some may differ with Major Young on certain points, it must be allowed that he has common sense on his side when he writes thus fearlessly in condemnation of our system as it is stands. It is not a perfect system—very far from it. The utmost, in fact, that can be said for it is that it is the best we have got, and that it supplies a temporary and pressing want. But what has the essayist to say as to improvement of system? Here, again, we will let him speak for himself: "From long study of the subject, I am certain," he says, "there is only one way out of this great difficulty—viz., to grasp the fact that there is a certain *vital unit* which must never be intermixed however often the line be reinforced, and that this unit is the company; that its normal formation must be a single rank at one pace per man, with an automatic change to a double rank where crowding occurs; that the front line be throughout the attack simply a line of companies moving independently in a general line, and that all reinforcements be by entire companies inserted into gaps caused by the companies in the front line closing on their centres at each rush forward sufficiently to fill casualty vacancies." The size of gap and mode of reinforcing may not be quite clear in the author's summary. As we understand his argument, it is as follows: In our existing drill a half-company of, say, 30 men, requires a gap of 60 paces. Under that proposed, the same gap suffices for the whole company—60 men=60 paces. Nor is this all: by using the double rank temporarily until there is room, a gap of only 30 paces will suffice—60 men=30 files=30 paces,—or the same gap as now for only a section. Either mode would be used presumably according to the circumstances of the moment by the captain of the reinforcing company; but the double rank being just as safe practically as the single rank, the second mode would, we have no doubt, become the ordinary one. Thus each reinforcing company would go into the line in a gap of about 30 paces, gradually expand—as it gains single rank—to a front of about 60 paces, and then begin again to contract towards its centre, as it loses men, thus creating fresh gaps on its flanks into which in turn fresh companies enter. Ob-

viously this process can continue *ad infinitum*, quite unaffected by the number of reinforcing lines. One thing is certain—viz., that whatever is to be the tactical unit must likewise be the unit of reinforcement; and *vice versa*. whatever is made the unit of reinforcement will, by force of circumstances, become the tactical unit. To hope to reinforce by any fraction of the tactical unit and maintain cohesion is an illusive idea born of the parade-ground. There is undoubtedly much that is sound in the idea put forward, and it is not surprising that those with whom rested the duty of awarding distinction to several competitors singled out this paper for special mention. The question of the attack has formed the subject of much controversy for years past. The highest authorities have expended thought upon it, and change after change has been introduced after more or less mature deliberation. But we have not reached the ideal yet, and never shall do, we suppose, so long as science progresses to upset preconceived notions and alter everything. Discussion, however, is a thing to be encouraged at all times, and in this instance the views expounded are such that we are disposed to stretch a point and afford the essayist every opportunity in our power of making his ideas known. There must, of course, exist a difference of opinion as to the merits of the scheme here formulated; but the paper is one that recommends itself not only on account of the independence of its tone, but also by reason of the general soundness of its reasoning and the clearness of its style.—*The Army and Navy Gazette*.

THE TACTICS OF COAST DEFENSE.

On Wednesday last Lieut-Colonel Walford, R. A., read before the Royal United Service Institution an interesting paper on "The Tactics of Coast Defense." The lecturer in the first place remarked that in a previous paper read by him in May last, his intention was to make one fact perfectly clear, viz., that any system of defense which is to have even a fair chance of success must be based upon the co-operation of all the following several fractions:—*a*. The active defense, consisting of such ships, torpedo-boats, etc., of the Royal Navy as might be detailed to the particular harbor in question. *b*. The passive defense, consisting of the guns, the submarine mines, the torpedoes, the water defenses (such as guard-boats) and the electric light. Combination and concentration of energy must be provided for, not only between each factor of the defensive strength, but also between every unit of each of these factors. He proposed, therefore, to commence his present paper by discussing what should be the organization of the system of command in a coast fortress, and to add some notes on the duties of the various grades of commanders.

Colonel Walford, after stating that he did not intend to refer to any existing fortress, and that he should pass over the question of the land defense as coming rather under the head of Siege Tactics, and confine himself almost entirely to action against a naval force, went on to state that the system of command in a coast fortress should, like all other systems of command, be based upon the principle of the undisputed authority of the superior officer over each of the complete units which make up his command, combined

with the almost absolute independence of the officers commanding those units within the limits of their command. Instruction and practice in the correct execution of orders should form a part of the system of training in time of peace, and should not be either given or required when in the presence of the enemy. A distinction must be drawn between an "order" and a "word of command;" the latter must be obeyed to the letter, and mechanically, the former in the spirit and intelligently. The chain of command proposed may be summarized as follows: The commander of the fortress, the commanders of defenses, of sections, of units (such as forts, batteries, mining and torpedo stations, etc.), and of groups of guns, or (generally) of fractions of units. The officer commanding a fortress would have charge of the general conduct of the defense (including where necessary, the government of the civil population), and of all communications with the enemy, he would be the head and the heart of the defense, but it would be well that he should not endeavor to be the hands also.

The duties of the commanders of defenses, *i.e.*, the active, or sea defenses the passive, or coast defenses, and the land defenses, would be, each in his own sphere, to provide for the due execution of the orders given by the commander of the fortress; generally speaking, they will knit together for combined action the various sections which are under their command. The commander of each section would arrange for the combined action of all the units which compose it in such a manner as may best carry out the intentions of the commander of the fortress, which will have been explained to him by the commander of the particular defense under which the section may come. The commanders of units, within the limits of the coast defenses, would be as follows: Artillery Officers commanding the main forts and batteries armed with heavy and medium guns; officers commanding the batteries of guns intended for high-angle fire; officers commanding the light armament, provided for the defense of mine fields, and officers commanding the movable armament, consisting of Field Artillery. Engineers—Officers in charge of submarine mines; officers in charge of torpedoes; and (other arms) officers in command of detachments of Infantry.

All the above, when present, should be under the command of the officer commanding the section. The electric light should in all cases be under the orders of the officers commanding artillery units, as it is far more urgently required by them than by the officers in charge of submarine mines. The guard-boats, steam launches, etc., which make up the water defenses, should be employed rather for the advantage of the whole system of defense than for that of any one fraction, and therefore the direction of the action of the water defenses should be placed in the hands of the officer commanding the coast defenses, and not in those of any local authority. To the commanders of units named above should be committed all matters connected with the technical duties of their several arms, and they should be each independent of the others as regards the actual working of their commands. Commanders of subdivisions of units will be the junior officers of each arm, such as the commanders of groups either of guns or mines; they will be responsible for the state of preparation and the efficient work-

ing of their respective commands, and will attend to minor details of equipment, the supply of ammunition, stores, etc.

The lecturer then proceeded to give in considerable detail the several duties of the various grades of commanders in anticipation of an attack, and gave a slight sketch of the system suggested for the supply of the troops, the transport of wounded, the replacement of casualties, and the renewal of ammunition.

Colonel Walford next considered the duties of the various grades of commanders during the progress of an action. A little consideration of the tactical conditions of the defense of a fortress will show that the position of the commander of a fortress is very different from that of a general in command of a field which is standing on the defensive. In the defense of a coast fortress (omitting that of the land fronts), by far the larger proportion of the available force will be absolutely without mobility, since the guns, mines, and torpedoes will be fixed in localities long previously selected, and thus all power of movement, and therefore of counter-attack, will be limited to the sea-defense, the water defense, and the infantry of the coast defenses; while of these the offensive power of the second will be very limited, and that of the last available only in the case of a landing by the enemy. On the other hand, the assailant will, except in the attack of an open roadstead, be compelled to advance on lines which will have been realized and studied beforehand, and will thus cease to possess that initiative which conduces so much to the advantage of the attack, but which is only possible on the supposition that there is no limit to manœuvring. Since, for the above reasons, the strokes and counter-strokes of the attack and the defense will, in most cases, proceed in more or less regular sequence within hard and fast lines, it follows that the share in the defense which falls to the commander of a fortress will find most of its active expression before the actual commencement of the combat. The duties of this officer might, therefore, be summed up as follows: 1. The consideration and approval of any measures of the counter-attack which are proposed for the sea-defense. 2. The suggestion of approval of any counter-attack by the land forces which may require the assistance of the central reserve. 3. A decision as to any enlargement or variation of the scheme of defense which may become desirable, owing to the partial success of the assailant.

In the case where the commander of the fortress is a military officer, it is very desirable that the commander of the sea-defense should be not only permitted, but encouraged, to make suggestions with regard to the use of his command, and to point out such opportunities as may arise for its use against the enemy; he should always be consulted with regard to the time and dispositions for any counter-attack by sea. The commander of the coast defense, will, in addition to the general charge of the whole of the coast forces, have under his direct command the local reserve, the movable artillery armament, and the water defense. It is not necessary to say more of the local reserve than that it will be employed to resist boat attacks and landings in small force, and also to provide for such a system of outposts as shall prevent the possibility of a surprise by night. The movable artillery armament will as a rule be associated with the reserve in the discharge of

these duties; it may also be required to assist the light armament in the protection of mine-fields, in which its mobility, and consequent power to change its position, will be of great advantage.

The commander of the coast defense should devote especial attention to the water defense. It would at the same time be very undesirable to limit his duty to the conduct of this small fraction of the defense, and he should exercise supervision over the whole of the general conduct of the action, and should be present in person near the point of the main attack.

The defensive action for the commanders of sections might be in most cases roughly divided into three phases, viz.: 1. The period of high-angle fire. 2. The defense of the mine-fields. 3. The close fighting of the forts and batteries. Of these, the first will, as a rule, be completed in each section before the last two commence. The second phase includes the combined action of the mines, the light armament, and (occasionally) some portion of the main armament. After the destruction of the mine-fields, and (perhaps) the silencing of the light armament, the main attack at decisive ranges will commence. The commander of the section should have made preparations for this by, if possible, laying fresh mine-fields under cover of the main armament; if this be not feasible a moderate use of dummy mines might tend to cause the enemy to hesitate or to move with caution. The guns and the torpedoes will, however, be the principal arms employed during this phase. It is the duty of the commander of a section to direct the action of each of the units under his command upon such objects as he may deem it of importance to engage.

The lecturer confined himself to the mention of a few of the principles which should guide commanders of units when in action, as follows: 1. There must be absolute and immediate obedience to the spirit of the orders and instructions transmitted by the commander of the section, who alone is able to judge of the relative importance of the various targets. 2. Ammunition must be carefully economized, both with respect to the rate of fire and also with regard to effective range. 3. Smartness and decision in the selection of the projectile and in the orders given are most necessary; hesitation entails not only loss of time by the officer, but also loss of confidence by the men. 4. It should be remembered that the duty of a commander of a unit is to fight only; he has nothing to do with tactical combinations, which must be left to the commander of the section, who alone is responsible for the proper selection of the object of the action of his command. 5. The commander of a unit has therefore no right to change his target without having received orders to do so; if this were permitted, it would lead to the frittering away of fire at the discretion of irresponsible officers. He is at liberty, however, to draw the attention of the section commander to any change which may appear desirable.

As to the duties of commanders of subdivisions of units, Colonel Walford contented himself with calling attention to two points, namely, the supply of ammunition and the replacement of casualties within the fort, battery, etc., while actually engaged. When the commander of a unit is posted in a station beyond the limits of his command, it will obviously be impossible for him to attend to this matter; while, even if we suppose him to be

actually present with the guns, his attention will be so taken up by his sole duty, the conduct of the fire, that he will have no leisure for minor matters; it follows, therefore, that these must be left in other hands. In small forts, etc., such details might be left to the commanders of groups and their representatives in the Engineers, but in the case of large works it will be necessary to tell off a special officer to take charge of these and other cognate matters within the fort; this officer should be senior to the commanders of groups.

The lecturer then turned to the consideration of an adequate provision of means of intercommunication between the several grades in the sequence of command as being absolutely necessary to permit of the working of any systematically combined plan of defense. Too much stress could not, he said, be laid on this point, since without such provision of a sufficient kind many opportunities must be lost and much disadvantage suffered, for without it the chain of command is broken, reciprocal action becomes hopeless, and the concentration of fire impossible. Those who have not carefully considered the conditions which govern the defense of coast defenses are inclined to undervalue the importance of this question, since, remembering only the size of the target offered by a battle-ship, they forget or do not regard her power of rapid movement. Officers, even of the artillery, are inclined as a rule, to imagine that the service of coast batteries is a duty which may be deliberately carried out, and are tempted to believe that, as the guns are heavy, so the work must be slow. It is true that in cases where the nature of the channels or of the coast line compels the attacking ships to anchor in order to obtain full effect from their fire, this may be in some degree the fact; but, under circumstances which permit them to take advantage of even a moderate rate of speed, the movement of the target is far quicker, and the opportunity for efficient fire far more fleeting than is the case with the targets offered to artillery in the field. No force in the field, not even galloping cavalry, can equal, except perhaps for a few minutes, the speed of a ship which steams at the low rate of 12 knots per hour—a pace which may, under ordinary circumstances, be maintained during the entire progress of an attack. The guns and mines of a system of defense must, therefore, be prepared to cope with an enemy gifted with the power of exceptionally rapid movement. and their conduct in action must be proportionately accelerated and simplified. This acceleration, if it is to be combined with a facility for insuring co-operation in action, can be obtained only by means of a complete system of rapid intercommunication between the various fractions of the defense.

It will be evident that oral signals, whether by speaking tubes or the telephone, will be useless in the noise of action, while visual signalling, by means of flags, semaphores, or cones, is not only slow and liable to error, but suffers moreover from great disadvantages, viz.: 1. It is possible that the signals may be read by the enemy, especially since the code must be made out beforehand, and the enemy may thus have an opportunity to gain possession of the key. 2. The flags, etc., point out to the enemy the position of the spot from which orders are emanating, and thus enable him to bring fire to bear upon the local centre of defense. 3. Such signals would

be useless at night or in a fog. If we abandon all such systems as useless, we shall find ourselves limited to electric (or perhaps pneumatic) communication, such as shall record the orders given on a dial or similar contrivance at the receiving station. The provision of such a system would certainly be expensive, but, since the value of artillery fire, in coast defense as well as in the field, depends entirely upon its concentration, it is probably no exaggeration to say that more advantage would be gained by the creation of such a network of communications between important points, than by increasing the weight or the number of the guns.

It is especially necessary to provide some such system of communication between the commanders of units and the group commanders of artillery, since when in action the former must transmit orders to the latter at least once per minute, in cases where the guns are (as they should and probably must be) directed from a station beyond the limits of the fort. Under such conditions electric communication is indispensable, as it is also between the unit and section commanders, while the further provision of lines to the commander of coast defenses, and from him to the commander of the fortress, would be a small and simple matter. These last lines might be improvised in anticipation of an attack, and might even without any very serious disadvantage be dispensed with, for the general tactical plan of the defense will seldom be liable to any very sudden change of conditions or to any consequent instantaneous alteration since the tactical considerations are more or less permanently fixed by the character of the site. But with respect to the forts it is absolutely essential (under penalty of an enormous loss of efficiency) that immediate communication shall be possible between the groups and the unit commanders, who are in truth the eyes of the guns.

The lecturer, in drawing his paper to a close, stated that he had endeavored to sketch a coherent system of command applicable to a coast fortress, to show the duties of the various grades of officers included in it, and further to show the urgent necessity for the provision of a complete network of intercommunications within the fortress; but he had not, he regretted to say, been able to mention other points of almost equal importance, such as: 1. That all officers and men, especially of the Auxiliary Artillery, should be drilled and worked in the actual forts which they will have to defend in action. 2. That all officers of artillery should be trained in the duties of group commanders, while all field officers should be competent to act as commanders of units. 3. That the entire scheme of defense for every fortress should be drawn out on paper in time of peace, and that this scheme should include all matters connected with the distribution of supplies, hospital accommodation, and the renewal of ammunition. 4. That all officers who by this scheme would be called upon to discharge the duties of one or other of the grades should be confidentially warned of the fact during peace, and should be expected to qualify themselves for those duties. 5. That every fort in each fortress should be occupied by Regular Artillery during some portion of each year, during which time practice should be carried on (under Service conditions, and not by the fire of individual guns), and all defects should be noted and made good. 6. That the mobilization of the garrison in each fortress should be carried out at least

once a year by day and night. *He desired to draw a conclusion from the paper, viz., that this matter of coast defense is not a purely Artillery or Engineer question, but equally concerns officers of Infantry. He did not mean by this that we have any right to expect officers of Infantry to study details connected with gun drill or the construction of submarine mines; but that officers of Infantry should be accustomed to realize that, when defending a coast fortress, they may be called upon to take a very prominent part in the struggle, and that therefore the principles of coast defense were not unworthy of their attention.*—United Service Gazette.

THE GERMAN GENERAL STAFF.

The axiom that responsibility conduces to the development of power has never been better illustrated than by the sterling ability of the officers of the German army. To speak of the General Staff of that highly organized force as its "brain" does not wholly represent the truth, for in every grade above that of subaltern, and even to some extent in that, the German officer possesses a certain freedom—even a right of initiative—with corresponding delegated responsibility, independent of the central authority. We mean, for example, that the captain, in regard to his company, may, in the exercise of his judgment, adopt such methods of instruction, within limits, as he pleases. His superiors look to him for results. In the Felddienstordnung of 1887 it is prescribed that, "without fearing responsibility, every officer, in all circumstances, however extraordinary, is to stake his whole personality for the fulfilment of his mission, even without waiting for orders." He knows very well that his chances of success in his career depend upon this fulfilment, and this almost precludes the promotion of incapable men. In an excellent little volume which we have before us, and concerning which we propose to make a few remarks, Mr. Spencer Wilkinson describes the steps in the advancement and training of the German officer, and rightly says that, by the time the officer attains General rank, "he has acquired a vast and varied experience; a practised eye, whose rapid and penetrating glance on the march and in the field seems to laymen almost miraculous; and a sureness and swiftness of judgment which decides without fail in an instant nine-tenths of the questions which arise in the exercise of command." It may be said, in fact, that the training of the individual—the development of the highest powers both in the field of thought and action—is the prime object of German military institutions. Nevertheless, if any one were asked what is the most prominent feature of the German army, the answer would probably be, "Its organization," which, indeed—possessing the double advantage of centralized and extended intelligence and control—approaches, in its fine adaptation of means to ends, more closely to perfection than any other like organization that the world has ever seen. The purpose of Mr. Wilkinson's book is to describe the central thinking body of the German army—the "brain," as General Brackenbury has called it—and its relations, of action and reaction, with the ranks. He has written it for the statesman, if "at any time such should*

* *The Brain of an Army; a Popular Account of the German General Staff.* By Spencer Wilkinson. London: Macmillan & Co.

be found to undertake the work of an English Minister of War," as well as for the public upon whom that statesman would depend, convinced that, being perfectly familiar with the German Staff, "he would be able to reform without destroying, to rise above that servile imitation which copies defects as well as excellencies, and, without sacrificing its national features, to infuse into the English system the merits of the German." To our thinking, the most noteworthy point concerning the German General Staff is the close relationship which it constantly maintains with the ranks, and the influence the Staff and the ranks have upon one another. This will be explained by a quotation from Mr. Wilkinson's book :

"A captain on the Staff, after four or five years' work, is transferred to a regiment. A year or two later he may be again selected for the Staff as major. After a further term he will receive the command of a battalion, then return to work on the Staff, and afterwards be promoted to the command of a regiment. From this post he may again be chosen to the Staff, returning eventually as a major-general to the command of a brigade. * * * Service in the staff-office of a division or army corps alternates with employment on the great General Staff, so that the officer whose diligence and ability have opened for him the Staff career, and whose performance secures him periodical return to it, passes through the various stages of regimental service, of service on the General Staff of the great constituent units of the army, and of employment in the great central agency of direction. * * * Nearly all the higher commanders have passed through the various stages of duty in the General Staff. The General Staff is perpetually training fresh generations. Some sixty junior officers are temporarily attached to it without being incorporated,—that is without ceasing to belong to their regiments. They are the pink of the hundred lieutenants who every year leave the Kriegsakademie, or Staff College of Berlin. * * * In this way the General Staff keeps up its numbers by the continual selection of the fittest."

We need not dwell upon the advantages that flow from this constant intercommunication. Regimental officers, either by their own experience or through that of their companions, are in perfect touch with their ideas of the "great central thinking department," and this department in turn derives a full measure of benefit from the practical knowledge of men fresh from nearly every grade in the ranks. The General Staff numbers in all about two hundred officers, seventy-five of whom are with the army corps and divisions, while a hundred approximately, form the great General Staff in Berlin, some fifty of these latter being on the auxiliary establishment for purely scientific work. No experience could be more serviceable than that gained during the Staff employment of these men. The Intelligence department of the work of the great General Staff is singularly complete. It takes cognizance of every possible fact the knowledge of which might be of service in a war with any country. Its officers are constantly engaged in collecting and classifying a vast quantity of information concerning the various States of Europe, and other States in smaller degree,—their maps, surveys, plans, guide-books, and books of travel; their census and educational returns; and their constitution, administration, finance, emigration particulars, natural resources, manufactures, trade, shipping, and means of communication, as well as every statistic relating to their armies and navies and their coast and other defenses, and a whole host of other such matters. As Mr. Wilkinson says, "the minute systematic study which is thus devoted

to the resources of every European country gives a basis for judging of its fighting-power far more certain than the collection of mere military statistics;” and we may add that the officers who are engaged in such work are admirably fitted for service abroad. The great General Staff makes provision for every possible campaign, pays the utmost attention to all questions of mobilization and transport, and has a division devoted to the manipulation of railways in war, on which an attempt is made to give service to every General Staff officer. The Trigonometric, Topographic, and Cartographic Departments of the Government Geographical Establishment are served by officers on the auxiliary establishment of the great General Staff. It will be seen that the work in the Intelligence and other Departments, combined with regimental service under direct responsibility, forms an admirable training and discipline for military officers; but the Staff takes upon itself a teaching function also. The War Academy, in which the ideas of Scharnhorst have been developed and expanded, is under its direct authority and control. The *Dienstordnung* of the late Emperor Frederick defines the purpose of the Academy thus:

“The object of the War Academy is to initiate into the higher branches of the military sciences a number of officers of the necessary capacity belonging to the various arms, and thus to enlarge and extend their military judgment. Side by side with this direct training for their profession, they are to endeavor, in proportion to the requirements of the army, to penetrate deeper into certain departments of formal science, and to acquire mastery in speaking one or two modern foreign languages.”

One of the chief means employed by the General Staff for the training of officers for the duties of command is the study of military history according to the ideas of Clausewitz, and, as our readers are aware, several works of singular value have been published by its Historical Department. It is not enough for an officer to know the facts. He must understand their relations of cause and effect, and form a judgment as to the fitness of the means employed for the ends which it was sought to attain. Valuable as is the work of the General Staff in many directions, and powerful as is its influence upon the army, that work tends specially, as Mr. Wilkinson says, to the decisive act “by which the Chief of the Staff, from the information he has thus acquired, constructs a problem and designs its solution,—puts to himself the question, ‘What is now to be done?’ and answers it.” The institution of the General Staff, as he remarks, is in reality the development of a single idea, the embodiment of a logical analysis; but the military idea is kept in harmony with the political by the chief command of the Emperor, who holds, in both spheres, supreme control. Admirable, then, is the German General Staff, and in many ways noteworthy; and it is in no degree surprising that Continental States, which have to meet like conditions, are tending to an imitation of it. But for ourselves, much as we shall gain from a minute knowledge of its constitution and duties, we must remember that the conditions we have to face and the work we have to do are essentially different from those before the Germans, and that therefore it will not be enough for us merely to copy their military “thinking department,” as General Brackenbury has styled it, in order to create one wholly suitable of our own.—*Army and Navy Gazette*.

Comment and Criticism.

I.

"Outline of a Manual of Infantry Drill."

Prof. Peter S. Michie, U. S. M. A.

THE system of infantry drill tactics, outlined by Colonel Hawkins, certainly presents some striking departures from those now in use in our Service, and while we all agree that our present system requires radical modifications to adjust it to the new conditions of rapid fire, we must await the results of the labors of the Tactical Board for the solution of the problem. The devising of a system of tactics by a board of officers is even in itself a departure from the custom of our Service, since up to the present time our steps to the front, flank and rear have been wholly directed by the genius and thought of a tactician, singly and alone. In the system here outlined we have an individual solution of the problem offered for our unsparing but honest criticism. I have been so long accustomed to witness the well dressed and compact lines of our cadet double-rank companies moving over the level drill ground with such precision and with the elastic step of healthy youth, that the open order and four ranks of Colonel Hawkins' company do not at first commend themselves as a pleasing substitute. This sentiment, of course, cannot hold for a moment if we recognize that in the future the touch of the elbow must be sacrificed for the greater independence of action of the individual soldier. The plebe and the recruit in any new system are no longer to fix their steady gaze on the seam of the coat collar of the man in front, but must employ their perceptive powers on the movements of the enemy and their own progress to the front.

Granting that some such system is to be adopted, it is apparent that the rank and file must be men of greater intelligence and individual courage, of increased self-reliance and with more confidence in the skill and ability of their company officers than is now essential. And to offset the difficulty of obtaining such men in great numbers, we can see that, even with the few, the tactical advantages will be more quickly perceived, so that, when taken advantage of, the results on the field of battle will be more decisive than before. In actual combats there are two tendencies arising, even in the bravest, from the instinct of self-preservation, which largely control individual action; one is first to run away, which, being overcome, is followed by the desire to get as near to his neighbor as possible, to lessen the chances of being himself hit. Both of these tendencies will be very active in any open order of company formation, and can only be lessened by increased discipline. Mobility is certainly gained in the open order, but at the expense of steadfastness, especially in awaiting attack or active engagement under fire. That in the system proposed there is a great gain in both mobility and celerity is evident from the example cited by Colonel Hawkins, where this point was tested in the presence of officers, with troops of our Service. It is to be hoped that this system, which presents many advantages and few defects to the non-expert in tactics, will be subjected to the severest tests that its critics could devise or suggest.

Lieut. E. E. Hardin, 7th Infantry, U. S. A.

It is much to be regretted that we have only heard the outline of what must strike any infantry officer as a new and admirable system of drill for infantry.

The time saved in the formation of the company is of great advantage in any case, and would be of incalculable value in case of a sudden attack or surprise.

The open order system gives a peculiarly flexible column or line, and a simple and rapid means of developing the line or column into a line of skirmishers or into a line consisting of skirmishers, supports, reserves and main body.

The system also admits of the column or line being compressed into a mass as compact as necessary, for all manœuvres, such as marches where space is the first consideration, when it is necessary that an army should not be scattered.

Any system of drill prescribing certain fixed distances, absolutely, whether it be facing distance or elbow room must be faulty, whereas this system prescribes means for varying from facing distance to as many yards as may be necessary.

The ingenious manner in which calling off numbers has been avoided must command the admiration of the numerous officers who have attempted the solution of that problem, and given it up in despair.

The abolition of the numbers, besides the time it saves, gives a man a chance to think. In order to preserve the perfect drill under our present system, each man must concentrate his attention on remembering his number, and it would be a great advantage for him, no longer having that burden on his memory, to be able to use his mind for a more intelligent purpose.

I am sorry we have not been able to hear something more about the drill of several companies, but that is a matter of detail. The manœuvring of a battalion or of a regiment can doubtless be as well managed under this system as under any other, and those advantages which are apparent from what we have heard, would doubtless increase, as the system is applied to more troops.

This system appears to me to be readily adaptable to the system of fighting approved by modern authorities.

A regiment composed of three battalions of four companies each, the company being the unit of administration, and the battalion, composed of four companies habitually kept together, being the fighting unit, would be a command easily handled, capable of occupying a front of proper extent against all comers. The 300 men composing each battalion would be known to each other, and the advanced line could be reinforced successfully as often or as strongly as necessary without mixing commands, except the companies of the same battalion, which would be no more a cause for confusion than the mixing of the different squads of a Prussian company.

I think a field officer, four captains and eight lieutenants to the battalion would be enough officers, and do not think four lieutenants necessary to a company, but I do not imagine that the number of lieutenants assigned to a company would be in any way essential to the system.

Lieut. C. J. Crane, 24th Infantry, U. S. A.

The system of drill for the infantry presented by Colonel Hawkins is certainly far in advance of our present tactics and seems to meet the demands of the time for quick deployment under almost all possible conditions. By the methods explained for deploying the "normal line" and the "column of route," a firing line can be formed very quickly and easily.

The fact that the men would have at all times plenty of room to lie down, for rest or concealment, is a strong point in favor of the proposed "Company Field Drill."

The manner in which a skirmish line is to be advanced to the front or moved to the rear, viz., by "rushes" of alternate ranks, seems to be in accordance with the most modern opinions on the subject, and the method proposed for street fighting is a good solution of that problem.

"The line formation may have any extension from the touch of the elbow, if desired, to three or four times the front," etc. I suppose this will enable us to get from the "line of two ranks" faced to the right or left, a column of twos with sufficient distance between men to allow easy walking, such a formation being necessary for marching in the far West and along the country roads of the South, where there is often not room enough for a column of fours.

In giving us on the drill ground practice in so much that must occur on the battlefield, the system of Colonel Hawkins would put us fully abreast of the most modern ideas relative to the attack and defense.

To furnish the four lieutenants and eight sergeants for each company, as shown in the diagrams, a reorganization of the infantry arm of the Service would be necessary, but three battalion regiments and larger companies for the infantry are only questions of time.

I am sorry that the outlines of the "Manual of Infantry Drill" furnished us are so brief, but am very glad that this system, which I had often heard of, has at last been outlined to us.

II.

"Mackenzie's Last Fight."

Lieut. William H. Bowen, 5th Infantry, U. S. A.

I HAVE read with great interest Captain Bourke's "Mackenzie's Last Fight with the Cheyennes."

While according Generals Crook and Mackenzie every honor, justice must be rendered to one other before the concluding paragraphs of Bourke's narrative become accomplished facts, viz., Brig.-Gen. N. A. Miles.

Captain Bourke seems to forget the fights of Miles at Cedar Creek, Montana, October 27, 1876; at Wolf Mountain, Wyoming, January 7 and 8, 1877, and at Muddy Creek, Montana, early in May, 1877, besides a whole "Summer Campaign" during June, July, August and September, 1887, against the Sioux and Cheyennes, when he writes: "But the Spring Campaign was not to be." And again, "The game was in *our* hands."

For the result of Miles' Wolf Mountain fight see General Sheridan's "Record of Engagements with Hostile Indians," page 67. To controvert Captain Bourke's claim see his "Mackenzie's Last Fight," page 220, lines 34 to 38, as published in the JOURNAL of the M. S. I.

Bourke's narrative concludes:

"* * * *our* expeditions * * * has * * * supplied our national standard with the beautiful stars of the two Dakotas and Montana, * * *" leading the general reader to infer that Generals Crook and Mackenzie were the only leaders to whom the Nation's thanks are due for this glorious achievement.

Ask any old Montanian—and by old I mean residents of Montana prior to 1881—"Whom have we to thank, above all others, that Montana is now a State?" The answer will be, "Miles."

Please publish the foregoing in the next number of the JOURNAL.

FORT DAVIS, TEXAS, March 8, 1890.

Major G. W. Baird, Pay Dept., U. S. A.

Thanking the *JOURNAL* for its courtesy in the March number, I have to request a repetition of the favor.

Near the close of Captain Bourke's article, "Mackenzie's Last Fight," in the March number, he makes mention of Crazy Horse and, speaking of Spotted Tail, says "he started out to see Crazy Horse and had no difficulty in letting that stubborn redskin understand that he must come in on the full run." Writing, as Captain Bourke does, with full knowledge of the events, he seems to have presumed a like knowledge on the part of all of his readers, and so to have omitted the essential and efficient cause of Crazy Horse's surrender. Hence the picturesque statement above quoted is not wholly graphic and might possibly mislead. After the surrender to General Miles of Sitting Bull's following—mentioned in my note in your March number, "there remained," as Captain Bourke states, "but one band of any size, in spirit to fight, on the American side of the British line, the band of Crazy Horse," etc. This in the late fall of 1876.

Crazy Horse's following were camped on Tongue River. On the 29th of December, 1876, General Miles led a force of four hundred and thirty-six officers and men from Cantonment at the mouth of Tongue River against this force of hostiles. Miles' command was made up of Co's. "A," "C," "D," "E" and "K," 5th Infantry, and "E" and "F" 22d Infantry, each company augmented by details from other companies of the same regiments.

After skirmishes on successive days the Indians selected the cañon of the Tongue, where the river breaks through Wolf Mountain, as the place where they would annihilate the troops, and, on the 8th of January, 1877, turned upon them with their entire force—shouting, "You've had your last breakfast." The battle was a skilfully and a hotly contested one, lasting five hours, but a description of it is not my present purpose. The Indians were driven from the field with much loss.

The severity of the weather and all of the hardships and augmented difficulties attending a winter campaign can be partly inferred from Captain Bourke's narrative of the autumn expedition of which he writes. Following up this success General Miles sent an ultimatum to Crazy Horse, employing for that purpose some of the Indians captured in the skirmish of January 7th, accompanied by Interpreter John Brogvier. The General's message was "Surrender, either here or at your agencies, as you choose, or I will fight you again." Large delegations of chiefs and head soldiers, including Little Hawk, an uncle of Crazy Horse, came to the Cantonment on Tongue River to see if they could get better terms, and having become convinced, after repeated councils, that they could not, and knowing from experience that the threat in the ultimatum was no idle one, Little Hawk and the rest guaranteed to either bring the camp to the Cantonment or take it to the lower agencies. They left nine prominent men and head warriors, Sioux and Cheyenne, as hostages for the faithful execution of their agreement. This surrender was carried out; some three hundred came, April 22, 1877, to the Cantonment; the main camp, more than two thousand, led by Crazy Horse, Little Hawk and others, surrendered at Red Cloud and Spotted Tail agencies on May 1, 1877; the lapse of time indicating the figurative use of "on the full run" before quoted. By giving this an early insertion in the *JOURNAL*, you will do an act of justice to an efficient and successful force, including several members of the Military Service Institution, and will, perhaps, convey an item of interesting information to some who are not fully informed as to General Miles' winter campaign of 1876-77.

BOSTON, MASS., March 13, 1890.

Reviews and Exchanges.

Great Captains—Alexander.*

THIS is the first of a series of works which the author has in preparation on the Art of War. His intention, as stated in this volume, is to trace the development of the art from its earliest appearance on the pages of history down to comparatively recent times.

The evolution of the Art of War, as indeed of any other art, may be divided into well-defined periods, each of which has its beginning in the life of a master. The life of such a master is an era in the art, a revival as it were, during which great activity prevails and great advancement is made. New principles are recognized and established and old principles receive new applications. But these eras or revivals are of short duration. When their creators die their sun is set. There may follow a longer or shorter twilight, during which the influence of the great vivifier is still felt, but its effect soon fades out and the art sinks into sleepy routine, during which the methods of the master, although still practised, are not understood. And so night comes, and the art sleeps until aroused to a new life by the next master.

The lives of such masters, then, constitute the history of the art, and here in an attractive form we have the first chapter of that history. It is a goodly book; well written; well printed; well illustrated; well indexed, and generally well gotten up. It reads like a romance, and lives in the memory like a fairy tale. It has one feature which deserves special mention. Its chapters are preceded by a short, comprehensive and correct synopsis of their contents. This will be of great benefit to the student.

The works from which the author has gathered his facts—many of them rare—would constitute a fair sized library in themselves and indicate in some measure the amount of labor expended on the work. We are greatly pleased at the general appearance of the work, and almost regret the necessity of turning towards its pages in a spirit of criticism.

When the author says in his preface—page 14—that “Alexander created the Art of War,” we hardly think he means it in an unqualified sense, because he proceeds on page 6 “To say something about his predecessors.” And a very interesting story he makes of it. The military systems of the Babylonians and neighboring nations, and of the Jews under David and Solomon, cleverly sketched in the third chapter, clearly indicate that military methods were not unknown before Alexander’s day. Among the Jews we find an excellent militia system, and a method of recruitment by draft in time of war, which the makers of the military systems of modern Europe have hardly improved upon. The fact that the Jewish nation in the days of King David had an enrolled militia of 1,300,000 men, and that each tribe furnished 24,000 men for active service, compels us to admit that modern military systems are no new invention.

But there were other systems in ancient times which deserve a passing mention. In Egypt a rather unique method of creating and maintaining a military force was adopted by the father of Sesostris, and seems to have had a prolonged existence. The

* *Great Captains—Alexander.* By Theodore Ayrault Dodge, Brevet Lieut.-Colonel—retired.

story of its existence would constitute a very interesting page of military history. The system had its beginning in the enrollment of all the boys born on the same day as Sesostris. These boys and their male descendants were trained as soldiers from their infancy. They constituted that military caste of Egypt which, after centuries of honorable service, sank into insignificance some 1200 years before Christ.

In closing his masterly sketch of Oriental armies anterior to Alexander's day the author says—page 24—that “Cyrus subdued as large a part of Asia as Alexander did after him, holding the cities as *points d'appui*.” There must have been method in such management. Indeed, all that the author says in Chapter III. should be taken as the needful qualification of his earlier assertion, that Alexander was the father of the Art of War.

Moreover in Greece the Art of War had taken formal shape centuries before Alexander's day. Indeed the principles of tactics seem to have been very well understood in all powerful ancient kingdoms, and if we had complete records of their campaigns we should doubtless be able to divide up these seemingly dark centuries into periods marked out by the lives of forgotten masters, whose methods have escaped the pen of the historian. In all ages military tactics have been merely explanations of the best methods of using the weapons of the day. As soon as men began to act together in masses the opportunity for the tactician appeared, and unless human nature was very different from what it now is, the tactician appeared with the opportunity. This we think is sufficiently proved by the existence of vast empires which could neither have been the creatures of chance nor the children of ignorance. The methods of the conqueror must always have been superior to those of the conquered, and however crude the best of them may have been, they constituted a system the practice of which must be called an art.

In those days the soldier was a much more important member of the body politic than he is to-day. Among the ancient Greeks military service was the only key that would open the way to civil preferment, and crippled soldiers were cared for by the state. No wonder there were heroes in those days. But there was one decidedly weak feature about the ancient military system of Greece. Their leaders commanded by turns—day or week about. There is something decidedly democratic in that idea, and it seems to find favor with at least one modern nation. But it will not work. It was a failure in ancient Greece, and it will prove a failure in modern France.

The assertion that the ancients before Alexander's day knew nothing about strategy, which we meet at intervals throughout the book, depends for its accuracy upon the definition of strategy. History is somewhat barren on this point. As the author says on page 45 : “We can gather nothing from the legends of Ninus Semiramis and Sesostris which lends aid to modern war.” This is very true. But we are not justified in assuming that nothing existed. We find Cyrus—page 48—“acting on that oldest and soundest of military principles to do that which your enemy least expects,” and the chances are that he was not the first commander that did so. Anti-Alexandrian strategy may have been different from the strategy of to-day, but then the conditions under which it existed were different. The art of fortification had made considerable progress and it was used strategically. To fortify a capital city and make it secure against a besieger was just as much strategy in those days as the establishment of a safe base and depots of supply is strategy to-day. The two operations are of exactly the same nature. Then the laying waste of their own country in front of an invader, as practised by the Scythians, was just as good strategy as the similar performance by the Russians during the Moscow campaign. And just as effective. Indeed the author seems to think so himself in spite of his assertions to the contrary, for he says on page 53, in speaking of the Scythians : “Perhaps no savage nation

ever exhibited sounder natural strategy." And we maintain all good strategy is natural. When a whist player resorts to finesse, he must do it in a natural manner or his stratagem will fail. If there is anything in his manner to arouse the suspicions of his adversary, he is a bungler and not a strategist. We do not agree with the author in the definition which he quotes and adopts, that strategy is "The art of making war upon the map." Strategy is the art of deceiving your enemy. The thimble-rigger is a strategist. His tools are three thimbles and a pea. He covers the pea with one of the thimbles in the presence of his adversaries, and then moves them about in a seemingly careless way, accidentally tipping one of them and unconsciously discovering the pea to the audience just as he makes his bet that they cannot tell him where the "*little joker*" is. They think they know where it is. They bet; they call, and they lose. The pea is not there. What they thought a blunder in manipulation was a piece of consummate strategy. And it is just so in war. The difference is only in degree. The player manipulates army corps and bets a kingdom, but he gives his adversary the necessary glimpse to make him bite, and, if he is a good player, carries off the stakes.

Strategy is the mental game between the commanders, and precedes the physical game between the armies, which is tactical. The strategical game may be prepared—studied out—on the map, but it is played in the theatre of operations. Indeed, some strategical games are played entirely on the battle-field. Marathon is an example of this kind of strategy. It gives us a perfect picture of a brilliant tactical *coup* which was closely allied to strategy. The Battle of Marathon is sketched in Chapter VII.

Perhaps no commander ever entered upon what is known as a pitched battle without some definite idea as to his plan, and that idea may be read in the disposition which he makes of his troops. In other words the array contains the plan of battle. When the array exhibits a plane of weakness, so conspicuous that the enemy cannot help but see it, and disaster occurs at that very point, but is instantly checked and effectively countered by troops held in readiness for just such an occurrence, it is fair to assume that the apparent disaster was part of the general's plan. And that would be a sample of the strategy of the battle-field. There is a heap to be learned from the tactics of Marathon.

Strategy is a very difficult game, and it is doubtful if a man, without the natural talent for it, can ever learn it. A strategist is a reader of men rather than a reader of books. He must know his adversary better than he knows himself. He must know his weak points and his strong points. He must know exactly what it takes to establish a fact in the mind of his adversary, and how firm a hold the fact will have when it is established. He must know how his adversary will reason from established facts, and what action will most likely result from his reasoning. Then he must be able to manufacture the facts, sham ones of course, and contrive to bring them to his adversary's attention in the most natural manner. It is the finest kind of *finesse*, and no one but a master can play it successfully.

The retreat of the 10,000, or rather the functions of a rear guard as illustrated by Xenophon on that memorable march—sketched by our author in Chapter IX,—is a story which one would like to hear more of; and the expedition of Agesilaus into Asia, which seems to have pointed the way to Alexander, bristles with military lessons, just as important now as they were then. Agesilaus was an adept in the art of deceit, and deceit is an element in the Art of War. An adversary must be deceived, if possible, as to your movements and intentions. This is becoming difficult to do. Newspaper reporters and electric telegraphs make it almost impossible. There seems to be no clear way out of the difficulty but a return to the methods of Agesilaus. Lying has become a military necessity,

In the game of war between Alexander and Porus, sketched in Chapter XI., we have an illustration of the military importance of lying in order to deceive an adversary. A commander is not expected to advertise his intentions to his adversary. On the contrary it is his duty to deceive him to the utmost of his ability. If the saying or doing of things that are untrue, can give him an advantage over his adversary, how far is he justified in going?

Alexander purposely spread a false report that "he was afraid to cross the Hydaspes," knowing that it would come to his adversary's ears in a natural way, and that he would believe it. That was an essential point in his strategy. Napoleon deceived Milas in the same way during the campaign which ended at Marengo, when he contrived the bogus news that Moncey's corps had arrived on the Ticino. Lord Wolseley, too, if newspaper men are to be believed, let some of them hear him distinctly say, that his forces should not enter the Suez Canal. But why multiply examples? History is full of them. And perhaps the time has come when commanders of armies will be obliged to utilize the enterprise of the newspaper press in the way which will be of the greatest benefit to the cause they fight for.

As we come nearer Alexander's time the features of battle assume a more familiar aspect. Epaminondas practised the oblique order as neatly and effectively as ever Frederick did. No doubt Frederick's idea was copied from Epaminondas. Whether Epaminondas was a copyist or not, cannot, in the absence of historical data, be authoritatively determined; but it is more than likely that he was.

There is a striking similarity between the earlier years of Alexander and Frederick. Both were young when they ascended the throne. Both had been under a cloud. Both inherited excellent standing armies. The standing army of Macedon made Macedon master of Greece. Greece boasted of her freedom, valor, patriotism, declared she needed no standing army. Feared a standing army might endanger her liberties. And the result was she became the vassal of Macedon. The standing army which Alexander inherited made him master of the situation from the first. It was no sham army. The feats which it performed under the guidance of its young commander make one desirous of knowing something about it: what it was like: how it was organized and commanded.

After reading Chapter XII. one ought to know all about it, but the nomenclature is difficult to remember. However, one gets a clear enough idea of its tactical units, and their combinations and formations for battle or the march, as also of its weapons and armor. The nomenclature is of no importance to the picture. One also gets the idea that its drill was perfect and its manœuvres simple and few. Its officers were carefully selected. Promotion by merit was the rule and favoritism was carefully excluded.

"The Companions," so-called, both of the infantry and cavalry, were organizations composed of young men from the noblest families of Macedon, and allied tribes. Many of them were of royal blood. They were first established by Philip as a *corps d'élite*, and carefully trained and educated as future commanders of his troops. The Companion cavalry and infantry accompanied Alexander wherever he went. They were nobles by birth and fit companions for the king, although they acted as his guards.

Such a military school, the pupils of which were constantly under the eye of the king, in the battle and at the banquet, was the nursery from which superior commanders were drawn. They were selected by the king for assignment as suitable vacancies arose. Officers of inferior grades were selected in a peculiar manner. It was impossible for the king to know all his men as he knew the Companions. Consequently the king could not make selections for officers of the lower grades, either

for appointment or promotion. Still promotion for merit was the rule and some one must decide. To meet this difficulty judges were appointed—men in whom the whole army had perfect confidence—whose duty it was to hear and determine the claims of every aspirant for promotion, and report the most deserving to the king, together with their reasons for the selection. Alexander's soldiers were always well commanded and well led, and his rules of appointment and promotion explain the reason why.

There is nothing impresses the reader of these pages more forcibly than the fact that the military skill of those days was fully equal, and perhaps superior to the military skill of to-day. What has improved is the material. This is especially noticeable in siege operations. Deprive us of the use of gunpowder and other explosives, take away steam and electricity, and it is extremely doubtful if we could accomplish such an undertaking as the siege of Platea in the same length of time as the Greeks did. The account of this siege may be found in Chapter XIII. It is exceedingly interesting and contains the germs of many modern inventions.

But we stumble now and again upon statements so startling as to need explanation. For instance, on page 185, in a description of how a road was cut along the slopes of Mount Ossa for the invasion of Thessaly, we read that it was accomplished by "Blasting a foothold for his army where it could not otherwise make its way." It would be interesting to know what explosive was used.

Nothing better illustrates the military ability and statesmanship of Alexander than his careful and thorough preparation of home affairs before his departure for Asia. By celerity and boldness, tempered by that suavity of manner for which he was celebrated, he conciliated Greece and then turned on the barbarians. The Illyrians and Balkan tribes, having heard of Philip's death, rose in revolt against the young king, and even the tribes beyond the Danube assumed a threatening attitude. Alexander laid aside the velvet glove in dealing with them. Power was the only argument they understood, and severity was the only evidence of power they would recognize. Alexander convinced them in very short order that, although Philip was dead, there still was a king in Macedon.

There was one incident in these campaigns which we cannot pass without notice, because it is the brightest bit of battle-field strategy which we have thus far encountered in Alexander's career. Pelium was a frontier post commanding the mountain pass which led into Illyria. The rebellious Illyrians had possession, and Alexander marched against the place to eject them. He was permitted to approach, unmolested, through a narrow and easily defended gorge, and went into camp before Pelium on a piece of level ground of no great extent, which seems to have been only a wider part of the pass. Behind him was the gorge through which supplies had to be brought, and before him was Pelium. In every other direction he was hemmed in by rugged, impassable mountains.

When Alexander had established his camp and was about ready to begin the reduction of the stronghold, he observed that the heights which commanded the gorge in his rear were occupied by the enemy, and that his communications were cut. He also observed that the mountains all round him were occupied in force, and that instead of being the besieger, he was really the besieged.

Alexander recognized the gravity of the situation. He could fight the barbarians if he could get at them, but for the time being they were beyond his reach. If they had sense enough to play a waiting game, the Macedonian situation would soon become desperate. Alexander determined to draw them from their vantage ground, and for this purpose he paraded his army in battle array and began an elaborate drill on the plain before Pelium. The spectacle must have been grand, as it was unusual.

The barbarians had never seen anything like it before. They were charmed with it, and descended to the plain to get a better view of it. They had taken the bait. In an instant that army dashed upon them like a shaft from a catapult, and in a few moments all the barbarians that were not dead were scattered to the winds. The gorge was garrisoned, and in due time Pelium was reduced.

There is nothing enhances the efficiency of an army more than mobility. This is well-illustrated by the destruction of Thebes, which was a part of Alexander's preparation for the Persian campaign. The cities of Greece were not friendly to Alexander. They had submitted only because they were afraid to fight, and now that Alexander and his army were 300 miles away, and having enough to do among the barbarians, they began to breathe again. At last a rumor came that Alexander was dead—killed before Pelium—and there was rejoicing in Thebes. The Thebans protested that they had never been afraid of Alexander and that their hearts' desire had always been to fight the Macedonians. While this frenzy was at its height Alexander and his army appeared, and summoned the city to surrender. But the Thebans were in no mood to surrender. They were too proud to eat their boasting words, so they defied the king, and were promptly swept out of existence. It was necessary for Alexander to show the cities of Greece a sample of his severity. Some sacrifice must be made. Thebes offered herself as a victim and was sacrificed. Alexander's departure for Asia then became possible.

The prize for which Alexander and Darius were about to contend was the sovereignty of Asia. Alexander depended for success upon the perfect training and efficiency of his little army of regular troops. Darius depended upon numbers. He swayed the sceptre over a vast empire, commanded untold wealth, and could meet an invader anywhere, with overwhelming numbers. The result must have been an astonishment to Darius. There is a lesson in that part of the story which might find an application not far from home.

We cannot dwell upon the battle of the Granicus. Alexander's army did not disappoint him. The fighting was magnificent, and deserved to win. But Alexander's tactics look like the essence of recklessness, and it is difficult to decide whether the victory was due to the idiotic arrangements of the Persians or the valor of the Macedonian troops. But if Memnon and his mercenaries had held the bank, Alexander, perhaps, would have tried other tactics. As it was, Persian jealousy had posted him in the rear, and Alexander's tactics became practicable.

We had marked for comment many passages in relation to the treatment which surrendered cities received at the hands of Alexander, but we have already exceeded the limits of a book review, and must pass them by. But no one can read that part of the history without being struck with the intellectual grasp and mental balance of the young king. Yet every now and then something turns up to unsettle our opinions and set us wondering once more what kind of a man Alexander really was. For instance, he declined to attack the Persian fleet, for excellent reasons, which he states with such clearness and force, in a conversation with Parmenio, that we are lost in admiration at the depth of his wisdom, when suddenly the conversation turns upon the significance of an eagle perching on the rocks near by, and the embodiment of wisdom which he had set up is suddenly enveloped in the mantle of superstition. His army believed him to be the son of Jupiter. Did he believe it? In spite of the fact that he encouraged such a belief in many ways, our author maintains that he did not believe it, and only encouraged the belief in others, from policy. And we agree with him. It is to be observed that the augurs and oracles religiously consulted by Alexander according to the customs of the Greeks invariably delivered themselves according to his wishes, and our author thinks that Alexander himself dictated the replies. It certainly looks

like it. But then is it not strange that a king with the mental powers and manly courage, and physical endurance of Alexander, should be unable to control his men, except by shamming superstitious belief in bogus oracles?

If anything were needed to demonstrate Alexander's military genius, his winter campaign along the coast, after the capture of Halicarnassus, would supply the need. The road to the heart of Persia was apparently open, and few conquerors could have resisted the temptation to take it. But Alexander was too wise to be led astray. The Persian fleet must be checkmated first. While it remained intact, Greece was liable to invasion, and there were elements in Greece which could not be relied upon in such a contingency. The situation was serious, but Alexander's good luck, and good judgment—it is difficult to say which was the more effective—rescued him from his embarrassment. Memnon, the able commander of the Persian fleet died, and the battle of Issus was won.

After reading the story of Issus one feels at a loss whether to praise the tactical skill and personal courage of Alexander, or censure the negligence which made such a battle necessary. In that battle—which could have been avoided—the Macedonians fought at a great disadvantage against heavy odds, and the effect of defeat would have been destruction. Now, the odds had to be encountered sooner or later, but the disadvantage and danger were clearly preventable. It is uphill work to argue against success, but it would be injustice to the military student to overlook negligence.

Space will not permit us to follow Alexander in his wonderful campaigns. Wherever he went success accompanied him. Sometimes the principles of the Art of War were observed and sometimes they were disregarded. But the results were always the same. Alexander's presence guaranteed success. No wonder that in that superstitious age he was accounted more than human. He could play the most dangerous game in the most reckless manner and always win. In forcing the Persian gates he risked everything. As the story is told in Chapter XXIX., he divided his force in the face of a superior enemy, and, relying on the word of a local shepherd, who might have been an enemy and could hardly have been a friend, he went off with over half his force over the snow-clad mountains, by paths which goats could barely climb, and which seem to have been unknown even to the natives, and after two nights of wandering, turned up at the right moment in the right place, and the Persian Gates were won. We cannot help thinking that if every incident had been faithfully recorded the feat of forcing the Persian Gates would appear as a more skillful and less wonderful story.

Another example of reckless daring which it would be unwise to imitate occurred in the pursuit of Darius. Alexander had pressed the pursuit with such energy that when he caught up with the army of Bessus he had only sixty companions at his back. The army was far in rear. But there was no hesitation. Alexander charged at once, sixty men against many thousand, and was successful. Perhaps the murder of Darius, which had just been accomplished to prevent his falling into Alexander's hands, had unnerved the enemy. Perhaps they were already demoralized and ready to be beaten. But Alexander knew nothing about it. He risked everything, and with his usual luck won the capital prize. But the incident can hardly be cited as an example of high military art.

But it is time to close the criticism, and in conclusion we would say: That while the book is interesting on every page, and as accurate as to facts as are the fountains from which they are taken, it is not a safe book to put in the hands of a military student. Alexander was a genius, and there is always a strain of insanity in men of that sort. Their methods are often eccentric, and the student is apt to attribute to the methods what really was due to the man, and thus be led into professional heresy.

A genius needs no rules of action. It is different with an ordinary man. If he would be successful he must be guided by the rules. If he attempts to copy the methods of a genius he must be prepared for the experience of Marshal Soubise. War is a spiritual as well as a physical game. It was the spirit of Alexander that carried his army through all its difficulties. Any other man, without such a spirit, attempting similar feats, although he copied Alexander's methods exactly, would certainly fail, and perhaps be laughed at. Success saved Alexander from ridicule, and he was accounted more than mortal by his followers, which was only another way of saying that no mere man, with only reason to guide him, would ever attempt such reckless undertakings.

So, in studying Alexander, or any other era-making master, hero worship should be guarded against. The problems which he encountered should be clearly stated. Then the solution, divested of all unnecessary details, should be given. A discussion of the principles involved might then follow, and finally the problem and its solution should be classified as an illustration in the application of the proper rule or maxim of the Art of War.

In spite of science, war is and always will be more or less a game of what we call chance, and in games of chance the reckless player is the poorest model for a novice. Of course the campaigns and battles of the great masters should be studied, but they should be studied as illustrations of the fundamental principles involved, and not as models to be blindly followed.

C.

Forty Years a File-closer.*

A file-closer is subject to certain local restrictions that interfere somewhat with Dr. Johnson's request to

"Let observation with extended view
Survey mankind from China to Peru."

This would be too much to expect from a person whose eyes are usually confined to the coat-collar of the man in front of him or at best to his back hair.

And any individuality that might diversify this latter appendage is ruthlessly sacrificed to the shears of the company barber.

To tower over these obstacles then and present to us continental landscape in the artistic manner of our author is a triumph of no small proportions, and if there is a tendency to warm up with a bit of color the cold light of truth we pardon the effort in a work devoted to the dry details of exploration and discovery.

The name of Captain Wonbar does not appear in the Army Register. And since he was forty years a file-closer it is quite probable

"He sleeps his last sleep, he has fought his last battle,
No sound shall awake him to glory again."

And we have the *search for Stanton* as the crowning achievement of his *état de service*.

There is an apparent exaggeration about many statements in this memorial only to be satisfactorily explained by personal experience in the marvellous sights and sounds of a life on the Plains.

It is a country of buried ships and cities, of legendary treasure and heroes to which Captain Wonbar is the guide and of which Joaquin Miller is the poet, and the weirdness of the locality goes far to explain what would otherwise be considered the improbabilities of the tale.

The dead are, of course, entitled to nothing but praise, nevertheless it is to be re-

* *Forty Years a File-closer*. By Captain — Bar. Washington: Chapman & Taylor, 1889.

gretted that the Captain should not have refrained from inaccuracy of expression like the following : " Then came the principal body of troopers, then the Signal Sergeant, then the train camels, and lastly the guard, *all* mounted on camels," which to say the least is a little redundant, and if true implies a reprehensible waste of transportation to which the attention of the Quartermaster General is invited.

Furthermore, there is a sort of defiant attitude in the text towards received conventionalities in phraseology and definition which is very perplexing, as for instance, when the " Great Shell River " is described as " flowing diagonally down stream." Properly, this characteristic belongs only to the Brandywine and other creeks of that ilk.

Neither is the Great Shell River down on the maps, and it would have been better if diagrams and an atlas had been prepared to illustrate the course and countries of this expedition.

Captain Wonbar adopted a precaution to which was doubtless due the remarkable directness of his journey, although at the sacrifice, perhaps, of such episodes of travel and adventure as might have been incurred in a more circuitous career.

This was to lash the compass needle so that it would not wobble. Few of us have failed to notice this defect, and the most generously supplied scientific outfits have been led to ruin thereby. Particularly where any doubt prevails as to the north end of this instrument, the simple expedient of the Captain will be found very useful, and would absolutely prevent a search for the venerable seat of the Aztecs bringing up at the grave of Sir John Franklin.

Often upon long marches a wise general smotheres any indication of weariness and impatience on the part of the men by starting a tune like Dan Tucker or John Brown and always with the happiest results.

This consideration for the legs of his escort was touchingly manifested by Captain Wonbar who kindly contributed both metre and material. It is a delicate subject, but being ourselves rather fastidious where poetry is concerned we venture to submit that the moral and educational effect would have been heightened by a judicious selection from Hiawatha or Walt Whitman instead of the constant refrain.

" Close to a dog-town, high and dry,
Upon a bed of limestone, sand and clay "—

which may be true, but gets to be wearisome and seems to lack the harmony and imagination that cheer without inebriety.

The city of Stanton was at last discovered and we regret to find that people there were so like our own and were wont to confer brigadier-generals' commissions upon drivers of ice wagons, &c. Probably this is a custom of the late Civil War which still lingers on these remote shores.

For a detail of the disclosures in this obsolete metropolis we must refer the reader to the book.

But it is to be hoped that some of the regulations once in vogue among the Stanton veterans may be incorporated in the new edition of our own, especially that which requires every enlisted man who deserts to file before leaving a paper with his captain showing the causes which induced it.

This would certainly save our officers from a great deal of unremunerative labor in their investigation of things which no fellow has yet found out.

We believe that most men desert because they have nothing else to do, and that two dress parades and four drills daily with signal practice in the intervals and a little analytical geometry for the long winter nights would soon stop the business.

There is no question either but that as at Stanton napkins should be furnished the

soldier if for no other reason than to keep him from using his pillow-sack for that purpose, and it is understood that the neglect to do so heretofore will be one of the reasons for the amnesty proclamation about to be issued for the benefit of those injured gentlemen to whom we beg permission to refer as disappointed military absentees.

The narrative under notice closes somewhat abruptly, which confirms our initial suspicion that its author, the Captain, is now in a world where bars are even more difficult to find than here.

Doubtless the transfer happened before he had revised his work. He has escaped the brain worry and gastric impatience that are the appointed lot of file-closers in all sublunary lands.

But fortunately his book remains. The few levities of manner to which we have alluded will disappear from future editions and we shall then have something amply qualified to take its place beside the other annals of our great discoverers from the Patent Office up to Powell, both inclusive. Why for our permanent consolation an inert Government does not order the immediate purchase and distribution of a thousand copies, together with Ingalls' Internal Ballistics, to each officer in service, will always remain a mystery, and in view of that fact the best thing we can do is to let individual enterprise make up the deficiency and so bring the hot blush of shame to the collective official cheek.

H. W. C.

Heroic Deeds.

In the interest of post schools for children and illiterate men, I beg to call attention, through your book notices, to two small books which I have recently seen—"Stories of Heroic Deeds," and "Stories of Our Country," published by D. Appleton & Co., 1 Bond Street, New York.

They supply a want which all who have had to do with post schools must have felt, for books that could be used for tolerably easy lessons in reading, and yet not so dull or childish as to disgust older children or men. Both are admirable. The latter especially suited for post schools. It contains thirty-six short stories of events, from the landing of Ponce de Leon to the Battle of Buena Vista, and cannot fail, I think, to interest its readers; to encourage a taste for historical reading, and, above all, to aid in forming an intelligent love of country, which ought to be one of the chief objects of our post schools.

The books are beautifully printed, not too profusely illustrated, and marvellously cheap.

H.

Guard Duty.

The manual of guard duty prepared by Lieut. L. W. V. Kennon, 6th Infantry, and of which the last edition has been published by authority of the War Department, is too well known to require description.

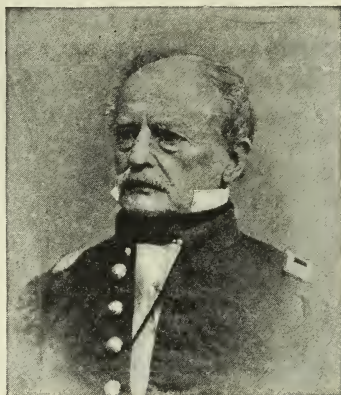
It seems almost a pity that the old question of stable guard for mounted troops could not have been settled somewhat differently from what is indicated in the footnote to page 4, but the author, of course, presents rules as he finds them.

Lieutenant Kennon deserves commendation for the excellent manner in which he has performed the work, and we congratulate him on having obtained the "meed of official sanction."

HANCOCK.

The Sun of Tropic's fiery day
Appeals but charms us not—
Give me the orb of genial ray
That shines without a spot.
Let heartless Power with splendor glow—
Give me the stately Great,
Whom high and low and friend and foe
With awe appreciate. —
O! Great & Good! Oh! Brave & Kind,
Too brief has been the span
That makes each friend thou leav'st behind
Feel proud that he is MAN.

NOTE.—The above tribute to the memory of the first President of the Military Service Institution is from the pen of the late Capt. R. M. POTTER (see next page).



Reuben Marmaduke Potter

Was born at Woodbridge, Middlesex County, New Jersey, February, 14, 1802. He died at his residence, 282 Franklin Avenue, Brooklyn, New York, March 18, 1890.

Captain Potter was appointed military storekeeper in the Quartermaster's Department March 23, 1848, and was placed on the Retired List of the Army, June 30, 1882. His military career was honorable and useful. A part of his early life was passed in Texas during the wild days, and he was a leading authority upon the written and unwritten history of that region. Small in stature, kind in disposition, gentle in manner, sober, just, firm, and brave, he went safely through times when the arguments used by frontiersmen to settle differences in taste and opinion were Bowie knives and Derringer pistols, and when death was sometimes the penalty for declining a Texan stranger's invitation to take a drink.

Captain Potter was a man of great learning, fine literary ability, clear and positive convictions, marked purity of character and unswerving fidelity to duty. The physical changes of lengthening years never disturbed the soundness or the satisfaction of his intellectual pursuits. He was always employed, and was always happy. Diligent in

improving his understanding, he was faithful in living up to his highest lights. In a letter to me dated June 19, 1886, he said : " I put up my headstone yesterday, and made my will some time ago." On the 5th of February, 1887, he wrote in response to my inquiry as to how he was wintering : " I am wintering well, and my health is good. I have the legitimate infirmities of age without the trimmings. No aches and pains, or lack of sleep, appetite or digestion, and no abnormal fear of death, though it ought to be looked for in nine days, for I shall then commence my eighty-sixth year."

Captain Potter bequeaths his manuscripts and all rights in his published works to General JAMES B. FRY, Vice-President of the Military Service Institution of the U. S., in trust for the Institution :

In his will, he says :

" I give back my soul to the mysterious source of life and mind from which it came, and my body to the elements from which it is derived. I die in the faith of The Unknown God, of whom Saul of Tarsus knew as little as I know, but I believe the Creative Power I refer to, whether, properly speaking, an element with personal attributes or a personality with elementary qualities, is the Great Mind from which Earthly Mind emanates, and the source of the Law of Nature and of Development, and, whether Individual or not, is the Head Spring of the Vast Flood of individuality which flows through Creation. I die in the belief of that unknowable but credible future state for at least the highest order of Individual Human Mind, which the inspiration of Human Instinct commends to our breast, for that instinct denies that the Creator would ever have doomed His mightiest work to early extinction. Father of Spirits ! leave not our souls in the dust !

" In what I have before set forth I willingly follow a venerable and, on the whole, a commendable custom, that of prefacing a will with a confession of faith, for, though it often seemed to give an adhesion to superstitious error, it fulfilled a natural desire of the testator to declare and justify by example what he believed to be truth."

In a codicil he provides that the names of all the deceased members of his family shall be placed on one side of his tombstone, and that the following shall be inscribed upon the other side :

" Heed thou who yet livest,
Give thy body to the living and leave the dead
in devout trust
to the unknown God,
Till thou, too, shalt hopefully
fold thy hands
with the silent multitude."

J. B. F.

OUR EXCHANGES.

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NO. XLV.

INFANTRY BATTLE TACTICS.*

BY CAPTAIN EDWARD J. McCLERNAND, U. S. A.,

SECOND CAVALRY.

THE formations to be given to the infantry as it arrives on the field of battle, and the various combinations of which these original formations are susceptible, are subjects well worthy of serious consideration.

Under the head of *battle tactics* are properly embraced all those movements, from the massing of the troops as they pass from the line of march to the selected field, and the sending forward of the first line of skirmishers, to the necessary strengthening of this line until it be sufficiently strong to grasp victory from the enemy. The cavalry, artillery and infantry must each play their proper rôle, but we will concern ourselves with the two arms first mentioned only so far as their action directly dictates the formation to be given to the foot troops, either to co-operate with, or to oppose those arms.

The division is, properly speaking, the grand infantry unit of combat, as the corps includes the other arms. Beginning, therefore, with the division, we will try to evolve principles suffi-

* Read before Vancouver Barracks' Branch, M. S. I., March 3, 1890.

ciently general in their scope to govern the action of all its parts.

If the army be acting on the offensive, the cavalry, with its accompanying artillery, will endeavor to seize and hold the ground most favorable for the operations of the infantry ; acting either on the offensive or defensive, they will endeavor to force the enemy to deploy, to reveal his intentions, and to delay his approach and concentration until the infantry be in position to enact its part.

Composition of a division of infantry. In general terms we will assume a division of infantry to consist of two brigades of two regiments each, a regiment being composed of three battalions of four companies each. The companies we will suppose 200 strong. Our division will thus furnish 9600 bayonets. Each battalion will be commanded by a lieutenant-colonel, and to each company we will assign one captain and four lieutenants.

It is true this organization differs from the one we now have, which has become obsolete among the great military powers ; but it is believed the near future will see a step in advance made in this branch of our military affairs.

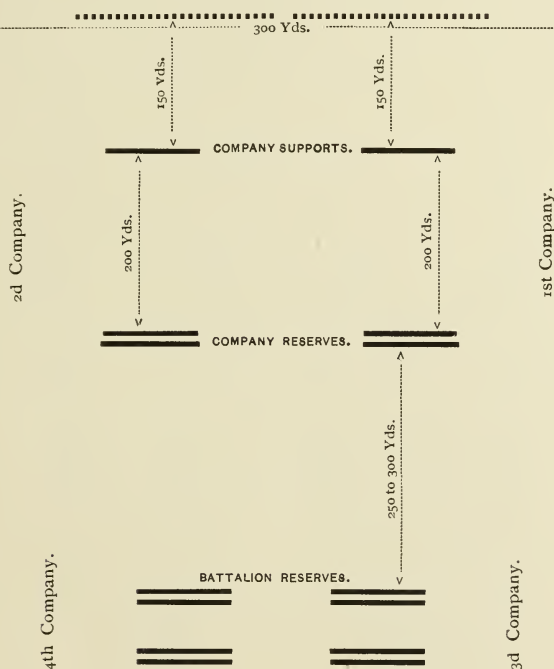
To serve our present purpose it is not necessary to go further into the details of this organization. The advocates of the established order always criticise adversely a proposition for a change, but the change comes, as it will sooner or later in this case. I will observe, however, that the tactics here proposed may, with a few changes, be applied to our present regimental and company organizations on their war footing.

Now, if the division be considered the grand unit of combat, it should be complete in all its parts and capable of sustaining the action along the interval assigned it on the line of battle ; that is, beginning with the skirmishers necessary to fill this interval, it should furnish all the succeeding lines, including the final reserves.

This method contemplates that the fighting line of each company be fed successively from the rear by men belonging to the same company, battalion, regiment, brigade or division. Thus the chances of disastrous misunderstanding between commanders of different organizations on the same line are greatly reduced ; each chief is in accord with the officers who support him, the relative rank of each being known, and the men being acquainted feel confidence in one another.

Under the head of *fighting line* we will include all those parts of the different organizations which are to participate in the earlier stages of the action; thus, in the normal order of the battalion, *two companies* in the formation of skirmishers, supports and reserves constitute the *fighting line*. The other two companies form the battalion reserve. (See figure 1.)

FIGURE 1.



In the regiment two battalions, in their normal order, as just described, constitute the fighting line, while the third battalion forms the regimental reserve. (See figure 2 on next page.)

The brigade and division may be similarly divided.

That part of the fighting line supposed to be actually engaged we will term the *firing line*.

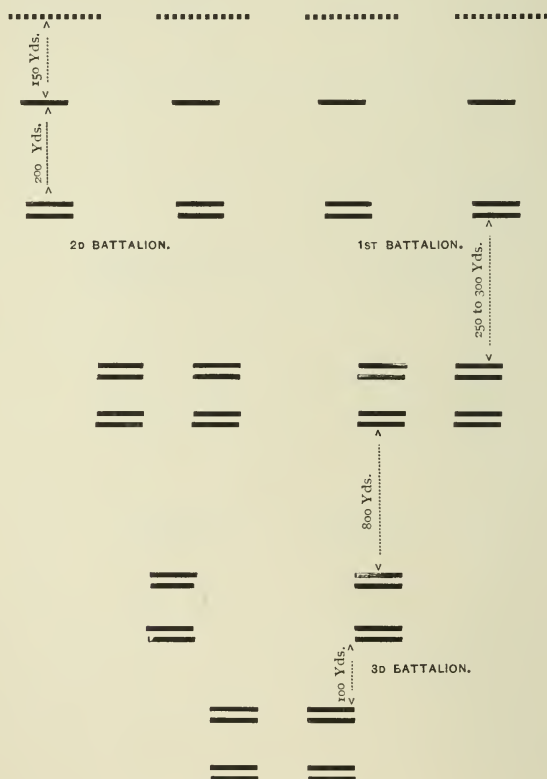
THE DIVISION.

The requirements of the modern action, as regards infantry, demand that the following conditions be observed: In the beginning the *firing line* should be composed of a few skirmishers, selected from the best shots belonging to the companies on the fighting line; close behind these, to give ready

aid, follow the company supports and the company and battalion reserves (figure 3); then the battalions acting as regimental reserves; and, as the reserves in front reinforce the preceding lines, these battalions move forward and take their places. All these participate in the earlier stages of the battle, and constitute the first line.

The losses necessarily sustained by the first line, together with the confusion incident to battle, makes a second line a

FIGURE 2.



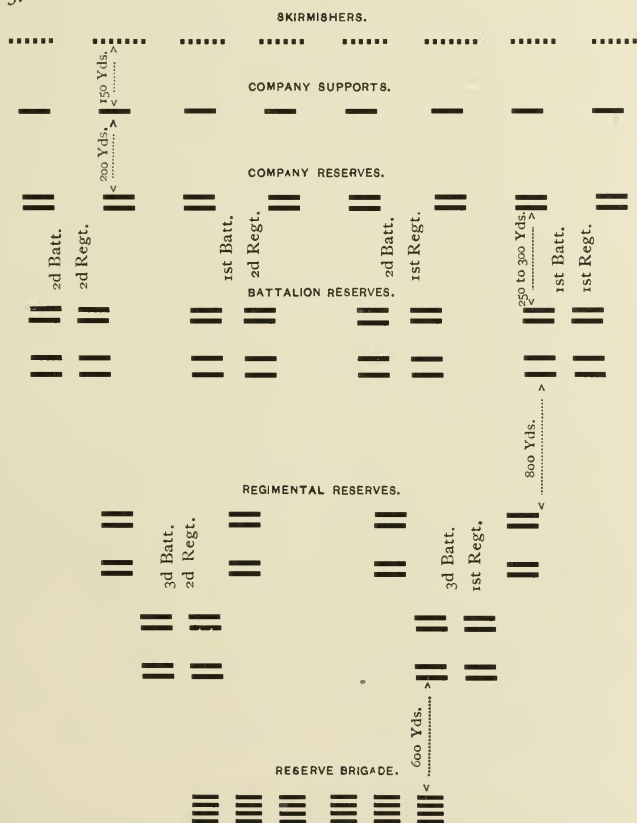
necessity. This line constitutes the division reserve, and is used either to extend the first, to make or meet a flank attack, to arrest retreat, or, to push an advantage gained. Moreover, its presence alone gives confidence to the men on the fighting line. "They also serve who only stand and wait."

On account of its distance from the firing line and the corresponding opportunity to seek shelter from the fire of the enemy's artillery, the division reserve should retain a well-ordered forma-

tion. Its orderly appearance, when called to the front, will inspire confidence and enthusiasm among those troops who have been hotly engaged, and thus largely contribute to success. Hence we divide the division in two lines; the first, or fighting line; and the second, or reserve.

The first line may be composed of one brigade, while the

FIGURE 3.



other brigade constitutes the reserve; or, each brigade may place one regiment in the first, and one in the second line.

In the first case each regiment of the leading brigade will place two battalions on the fighting line and hold the third in reserve. The rear brigade forms the division reserve, and will be posted about six hundred yards in rear of the regimental reserves. Figure 3 shows this formation.

This disposition will be preferable if the division be approaching the field of battle marching in a single column. Moreover,

it gives the general of a division a homogeneous reserve consisting of an entire brigade.

The interval occupied by the firing line (figure 3), composed of the front rank of one platoon taken from each of the eight companies represented on this line, is from 1200 to 1500 yards, or, in particular cases 1800 yards. The depth of the formation is about 2000 yards, as follows: From the firing line to the company supports, 150 yards; from the company supports to the company reserves, 200 yards; from the latter to the battalion reserves, 250 to 300 yards; from the battalion to the regimental reserves, 800 yards; and from the latter to the division reserves, 600 yards. When the two battalions composing the regimental reserves are posted in "battle order," as represented in the figure, 100 yards must be added for the depth of this formation.

In the second case, the first line will be composed of four battalions belonging to the two leading regiments, with two battalions as regimental reserves. Each brigade furnishes a regiment to form a division reserve.

This formation can be quickly taken if the division be marching in two columns, a brigade in each.

Supposing a succession of powerful efforts to be imperative, the two dispositions just cited may be supplemented by a third. In this instance the division will be deployed in one line, each regiment being in column of battalions. (See figure 4.) The flanks of the division should be protected by other troops.

FIGURE 4.



The employment of this formation will be justifiable only when it becomes absolutely necessary to success to make a lodgment on some point of the enemy's line, irrespective of the large losses to be sustained. The advance should be preceded by a heavy artillery fire, to shake the enemy. It will usually be best for the leading battalions to advance in several lines, the supports and reserves moving on the firing line as it closes with the enemy.

It is true, battles do not admit of the application of invariable rules, but the foregoing dispositions are of a general nature, and

thus are well calculated to meet the ordinary emergencies of battle. These formations are also susceptible of rapid changes and combinations, and enable the general to readily alter his plans to conform to any peculiar character of the ground or action.

The commands of the division commander should be communicated through staff officers; while of necessity general in their nature, they should, nevertheless, be couched as far as possible in tactical language, and embrace the particular formation desired for each brigade, or instructions for the brigade commander to be governed by special circumstances; the direction the line is to extend; the point where its right or left is to rest; with what troops to connect, and such further instructions as may be necessary to carry out his views. To avoid mistakes in transmitting orders, the names of the brigade commanders should be mentioned.

GENERAL RULES GOVERNING THE RESERVE.

Before passing to the next aggressive step—that is, to the dispositions necessary to fight the brigade—we will set forth a few principles which should govern reserves in general, and the division reserve in particular.

A reserve need not necessarily be posted in rear of the line to be supported; frequently it may be advantageous to form it in echelon with that line. The latter method will be particularly useful if the division be operating on the flank of the army, for it then serves either to threaten or to turn the enemy's flank, as well as to protect that of the general line, which is always a weak point. This formation may also be used to occupy the enemy's attention, while preparations for the real attack are being made elsewhere.

Officers in command of reserves must, while seeking cover, choose such formations as will least interfere with the movements of the cavalry and artillery.

Artillery is used in masses, and accompanies modern armies in about the proportion of one field gun to a thousand bayonets; space must be allowed for its employment accordingly.

The second line, under the direct control of the division commander, will be held under cover, and at a distance from the first, varying with the character of the action and the nature of the ground, until the necessity for its presence on the fighting

line becomes urgent; even then the employment of the entire reserve will be permissible only in the last extremity. When employed, it should be used vigorously and at decisive points. For, as stated by a distinguished author, the application of superior force at a decisive point is the vital principle of all warfare.

The reserve moves forward and occupies the positions formerly held by the first line, as the latter forces the enemy back. It need not necessarily be united; the battalions composing it may be posted in rear of different parts of the first line. Its commander should select from time to time strong positions in which to deploy his troops to contest the advance of the enemy, and to enable the first line to reform if driven back.

The officers of the reserve should be constantly on the alert to prevent any panic arising among the troops of the first line spreading to their own.

THE BRIGADE.

As stated above, our brigade is supposed to consist of two regiments of three battalions each, each battalion containing four companies.

In the brigade, the formation to be taken depends much on the nature of the ground and whether the brigade be acting alone or with other troops.

If formed in one line, four battalions should habitually constitute the front of the brigade, while the third battalion of each regiment will be held in reserve. (See the first brigade in Fig. 3.) The front covered may, as before stated, vary from twelve hundred to fifteen hundred yards, or, in particular cases, to eighteen hundred yards.

In two lines the leading regiment places two battalions on the fighting line and the third in reserve. The rear regiment, as a second line, is posted about six hundred yards in rear of the reserve battalion of the leading regiment, and will be given some convenient formation, such as in line of masses.

If the brigade be approaching the field of battle marching in a single column, the three battalions of the leading regiment may be placed on the fighting line, and a reserve battalion taken from the rear regiment, with the remaining two posted as a second line.

This formation, however, speedily disintegrates the second

regiment, and is objectionable except when the brigade is acting alone, and then only when a rapid extension of front is of the first importance.

For a succession of powerful attacks the regiments may be formed side by side in column of battalions. (Figure 4 shows each brigade in this formation.) Circumstances dictate the distances between battalions, and the usual intervals between regiments may likewise require extension or contraction. The colonels should avoid calling on their second and third battalions prematurely; the latter might be held until ordered into action by the general.

Neither the general of division nor brigade should have a fixed position, but should be careful to indicate where reports will be received.

The general may direct when the troops on the first line shall pass from close to open order, or this may be left to the discretion of the regimental and battalion commanders.

If compelled to give an order to a battalion commander, the general should immediately communicate this fact to the colonel.

There should be simple and familiar orders, enabling the brigade commander to move the line to the front, to the rear, by the flank, halt it, and cause it to change front. If a battalion be forced out of its position in the general line in the execution of any of these movements, its chief should cause it to regain its proper place as quickly as possible.

THE REGIMENT.

We will first consider a regiment operating with other troops, and afterward prescribe such rules as are especially applicable if it be acting alone.

The regiment will usually be formed in two lines, as shown in figure 2. Two battalions, in their normal formation for skirmishing, constitute the fighting line, while the third forms the regimental reserve.

The front covered by the first line varies from six hundred to nine hundred yards.

The reserve battalion should be posted about eight hundred yards in rear of the first line. This distance may vary with the nature of the ground; if the country be broken, or if there be villages affording shelter, it may be considerably decreased. To protect it from the fire of the enemy's artillery, the battalion

may be given various formations, in order to profit by any cover at hand.

The position of the colonel should be near the centre of the line occupied by the battalion reserves. If called elsewhere he takes the necessary precautions to indicate his whereabouts, and returns to his proper place as soon as practicable.

Acting under general instructions from the regimental commander, the reserve battalion reinforces the first line as circumstances require. Its mere appearance on the fighting line should be the signal for a determined offensive movement. It should not be ordered forward until the decisive moment, and then, if possible, it should be replaced by a battalion of the regiment in rear belonging to the same brigade or division. Its commander avoids separating unnecessarily the companies composing it, and selects from time to time favorable positions in which to deploy his battalion in order to contest the advance of the enemy, if the first line be driven back. In such an event the officers of the first and second battalions should avail themselves of the line so established by the reserve to reform their troops on its flanks, or in its rear.

The regiment will generally arrive on the field in column of march, and, if a delay occur awaiting the result of the action of the advance guard of the army, it will perhaps be convenient to form it in column of masses in rear of the position it is to occupy, avoiding unnecessary interference with the passage and movements of the other arms.

If the cavalry and artillery have reconnoitred the ground in advance, the commanders of these arms point out the most favorable positions to colonels and lieutenant-colonels of infantry as they arrive.

The regimental and battalion commanders should be familiar with the general principles upon which the cavalry and artillery arms are manœuvred and fought; thus they will be able to give intelligent co-operation, and to utilize fully the assistance rendered by those arms, and also better understand how to oppose them.

By first overcoming the enemy's artillery, and then concentrating its fire on the point of attack, the artillery prepares the way for the advance of the infantry, and at the moment of assault it directs its attention to the reserves of the enemy.

Colonels and lieutenant-colonels should be able to judge of

the effect of artillery fire, and know the distances at which the different varieties become effective.

If the enemy be beaten, cavalry will be especially useful in charging his broken troops to prevent their rallying and reforming their lines.

In defeat, the artillery, aided by the cavalry, strive to check the advance of the enemy, in order to enable the infantry to withdraw and reform.

If the regiment be acting on the flank of the general line, it may, either to menace or to turn the adversary's flank, advance to its position with the two battalions on the fighting line in echelon, and the third battalion in rear of the outer flank. In this way the regimental reserve not only threatens the flank of the enemy, but protects that of the general line. If there be no cavalry available, skirmishers or small parties should be thrown out to the flank and rear of the third battalion as a precaution against a surprise from those directions. This will be particularly desirable when skirting the edge of woods. Communication between the regimental and battalion commanders may be kept up by similar means, if more convenient ones do not exist.

THE REGIMENT AS AN ADVANCE GUARD.

If the regiment be the advance guard of a larger body of troops entering battle, one battalion may constitute the first and two the second line, thus enabling the colonel to hold his command well in hand.

It has been stated that, in the normal order of the battalion, two companies in the formation of skirmishers, supports and reserves form the fighting line, while the battalion reserve is composed of the other two companies; but when the regiment is acting as an advance guard, the leading battalion may place all its companies on the fighting line, and cover twice its usual front; this, in order to force the enemy to deploy his troops and reveal his position, as well as to thoroughly reconnoitre the ground and to prevent being outflanked. The second and third battalions follow in rear of the flanks of the first line, at a distance varying with the nature of the ground, but usually about six hundred yards.

This formation should be temporary.

The colonel must endeavor to determine the direction of the enemy's line, to avoid having his own assailed in flank. If, on

the contrary, the flank of the adversary be struck, the reserve battalions must push the advantage with all vigor, either by extending or directly reinforcing the first line.

If the enemy be found in front, as soon as he is developed in force, the second and third battalions deploy two companies, each in three lines, as skirmishers, supports and reserves, and hold the other two companies as battalion reserves, and then move upon the position which has been selected. The first battalion will be withdrawn *after* the others are in *position*. The regiment will then be in the formation shown in figure 2.

If passing a defile, the advance of the regiment should be covered by skirmishers taken from the first battalion, with the supports and reserves following closely. The second and third battalions are kept near, and on emerging take position in rear of the flanks of the first. To prevent the enemy passing between the flanks of the line and the entrance of the defile, the colonel may deploy all three battalions.

THE REGIMENT ACTING AS A REAR GUARD.

In this capacity the duties of the regiment are essentially defensive. Two battalions may be placed on the fighting line and the third held in reserve; or, as in an advance guard, this line may be composed of the four companies of one battalion, while the other battalions are in reserve. In making these dispositions the colonel must be governed by circumstances, principally by the energy of the pursuit. In order that the main body of the troops may gain time, the rear guard should struggle to hold the enemy at a distance; force him to deploy, and in every manner endeavor to retard his advance; and, if the conditions be favorable, it may temporarily assume the offensive.

Remembering that the ultimate purpose is to enable the main body to retire in good order, the colonel should avoid, if possible, so compromising his command as to require assistance. To prevent being cut off, he must not separate himself too far from the other troops, but if the corps in retreat be passing through a defile he should not hesitate to sacrifice his command if necessary to insure the safety of the main body. When the defile has been passed he should seek a favorable position to prevent the enemy from debouching, and if any have already debouched he will endeavor to throw them back in confusion on those still in the defile.

In passing a defile to the rear, the troops farthest from the entrance should begin the movement. Each battalion moves by the flank nearest the defile and withdraws under cover of its skirmishers, who follow as soon as practicable. On emerging, the colonel reforms his line on ground *previously* selected and indicated to the battalion commanders.

In passing a defile either to the front or rear, artillery, if possible, should be posted so as to bring a converging fire on the enemy's approach, thus enabling the infantry to form or withdraw under its cover.

THE REGIMENT ACTING ALONE.

If a regiment be acting alone the presence of a reserve is of the first importance, and the colonel must avoid calling on it prematurely; its duties are to reinforce the fighting line, to protect the flanks, to check the enemy if the first line be driven back, and finally, in case of defeat, to secure the line of retreat. Its position should be selected with great care, and should be distant from the fighting line about six hundred yards.

The force and composition of the enemy, the object to be attained, and the nature of the ground will determine the formation which the regiment should assume.

If acting on the offensive, the preliminary reconnoissance should be made as complete and carried as far as possible. Then one company from each of the two leading battalions will generally be sent forward in open order to develop the enemy, and as the resistance increases these companies will be reinforced by two more, giving the fighting line its usual strength. The latter companies will extend the first line, and, if possible, make a flank attack.

While dash always carries certain elements of success, the colonel should here remember his regiment is acting alone, and to engage all, or even the greater part of it, with an enemy whose strength has not been developed, may involve him with a force so superior in numbers as to make it impossible to extricate his command. This remark applies, of course, to commands either larger or smaller than the regiment.

If the regiment be on the defensive, the fighting line should be made strong from the first, each of the leading battalions deploying at least two companies.

PASSAGE OF LINES.

To relieve a regiment actively engaged on the firing line is a difficult and dangerous movement, justifiable only in an emergency.

If the movement be determined upon, the leading battalions (the first and second as shown in figure 2) approach the first line with their leading companies deployed as skirmishers, supports and reserves; or, should the character of the action require it, the skirmishers may be strengthened by the last-mentioned lines.

The skirmishers of each company of the new line relieve the skirmishers in their front. The company supports and reserves relieve the corresponding detachments in their front, and at the same time the battalion and regimental reserves of the new line move forward and halt near those of the old line. When the new regiment is in position, and not before, the other may be withdrawn.

THE BATTALION.

The employment of a battalion in action will be much the same whether the regiment be operating alone or with other regiments. We will assume the presence of the entire division.

Each battalion should have its proper refrain, to be sounded before the different trumpet calls, and whistle signals should be understood and used on the firing line as circumstances require.

Attention is invited to figure 3, showing the division preparing for battle in two lines, a brigade in each; to figure 2, showing the regiment with two battalions on the fighting line, and the third in reserve, and to figure 1, representing the battalion in its normal order for battle.

In the right half of the latter figure (1) the first, or firing line, is composed of the front rank men of either platoon, say the first; the company being divided into two platoons. It is commanded by a lieutenant assisted by six non-commissioned officers. The rear rank of the same platoon constitutes the second line, or support, and is likewise commanded by a lieutenant and accompanied by six non-commissioned officers. The second platoon with two lieutenants and thirteen non-commissioned officers forms the company reserve. The distances between the lines are shown in the drawing. The captain holds himself a few yards in front of the support. The usual interval between skirmishers will be two and one-half yards, and they cover an interval equal to twice the front of the company in double rank. The

skirmishers of a battalion will, in consequence, cover a space equal to its front in double rank, to be increased by one-half the usual interval (twenty-four yards) between its flanks and those of the adjacent battalions.

For a battalion of eight hundred men the front in close order, with the usual interval between battalions added, will be about 300 yards. This assumes the width of a man to be two feet, which gives greater freedom in marching than the twenty-two inches taken in our present tactics. In open order the front of a battalion may vary from 300 to 450 yards.

On the offensive. At from two thousand to twenty-five hundred yards from the enemy's artillery, this distance depending on the character of the ground, the two companies which are to take the advance are thrown forward one hundred yards, and each formed, if the ground be favorable, in column of platoons, with an interval between companies of once and a half company front in double rank. The third and fourth companies, which are to form the battalion reserve, move by the shortest line to a point one hundred yards in rear of the centre of the first line; they also are placed in column of platoons with an interval of platoon front between them. (For this formation see the 3d battalion in figure 2.)

This formation of the battalion we will call *battle order*, and is well calculated to throw a skirmish line quickly either to the front or flank. The battalion reserve will be under the immediate command of the second field officer, with the rank of major.

The battalion in "battle order," advances until within about fifteen hundred yards of the enemy's skirmishers, when the lieutenant-colonel orders the advance companies to deploy in three lines, as skirmishers, support and reserve. In a very *open* country the support may remain with the reserve until the firing line has closed to about one thousand yards from the enemy.

In deploying the front rank of the leading platoon as skirmishers, the centre man will habitually move straight to the front, while the other men lengthen the step and oblique to the right or left, according to their position, and having gained the prescribed interval move straight to the front.

The battalion commander strives to shake the *morale* of the enemy by securing at every stage of the advance a preponderating fire, for a concentration of fire, like numbers, at the decisive points means success; at the same time advancing in such

small fractions, up to the final rush or assault, as to reduce the casualties to the lowest limit.

The battalion commander takes position between the reserves of the companies on the fighting line. (See figure 1.)

The leading companies advance by short rushes, the officers and non-commissioned officers, including the corporals in ranks, pressing the line forward. Acting under general instructions from their respective captains, the chiefs of the firing line advance their entire line, the right or left skirmishers, or they may send the line forward man by man.

These chiefs select positions from which fire can be opened to the greatest advantage, and with the least exposure, and before each advance indicate whether the men are to move cautiously or on a run.

When firing from behind a crest, the position should be such as to enable the skirmishers to overlook the slope toward the enemy.

The men take advantage of every convenient cover, and should be instructed how to make loop-holes in walls and houses. When firing from woods, they should try to place themselves behind the first trees. Brush and standing grain afford concealment, but little other protection, and when firing from these the skirmishers should change their positions frequently.

To prevent a waste of ammunition is one of the most important duties of officers and non-commissioned officers. Except at artillery or masses of troops, when the firing is preferably by volley, only the best marksmen will be permitted to fire at eight hundred yards from the enemy's skirmish line. To more directly control the expenditure of ammunition, certain men may be designated by name and told how many cartridges to fire, or the firing may be by numbers. The officers should, from time to time, indicate the distance. As the line darts forward, from cover to cover, the chiefs authorize other skirmishers, according to their proficiency in marksmanship, to open fire; striving at all times to prevent a waste of ammunition; they should also guard against delay in opening a fire that may be effective.

Captains should be encouraged in employing all the resources of their companies in the most efficacious manner, being careful to avoid calling upon their supports and reserves prematurely. The open order now necessary in battle, requires that captains on the firing line be given great freedom of action.

The two reserve companies conform to the movements of the reserves of the companies on the fighting line; gradually diminish their distance from them, and finally replace them as the latter move on the firing line. The two companies may be held intact, or, in the discretion of the lieutenant-colonel, they may be deployed in several lines or echelons.

In the distances mentioned at which fire should be opened we have in mind the Springfield rifle, cal. 0.45, and a little less than the accuracy obtained by our troops in target practice.

At about five hundred yards from the enemy's skirmishers all the men on the skirmish line should be firing, and as the enemy's fire at this distance will also increase in severity, the firing line should pass from cover to cover by short rushes, seldom greater than fifty yards.

At 450 to 500 yards from the enemy the firing line will usually be reinforced by the support, which advances by short rushes, availing itself at each halt of any cover at hand.

We now have on the firing line one-half of the strength, minus the losses, of each of the two advance companies. The line so constituted continues to advance by short rushes, and not until it becomes impossible to make any further progress will the remaining half of these companies be ordered into action. Under general instructions from the lieutenant-colonel, each captain may send his reserve forward as one line, or it may be divided and sent forward as a *first* and *second* reserve.

The support and reserve may reinforce the firing line in either close or open order. The former formation will secure a greater intensity of fire. They do not necessarily reinforce the firing line from the rear; it may be advisable to extend that line. The reserve may also be divided, and one-half reinforce the right and the other half the left skirmishers.

At three hundred yards from the enemy (this distance varying with the nature of the ground) it will probably become necessary for the reserve to join the firing line. With this the skirmishers will nearly have attained the strength of a line in single rank at close order. It is probable the rushes cannot now be made for a greater distance than twenty-five yards. If necessary one half of the line, say the right, may move forward while the left half by its fire holds the enemy in check; the rear skirmishers are brought forward as soon as the first half has opened fire. In this way the line is advanced to within two hundred yards of the

enemy. Rapid fire has commenced, over which the officers and non-commissioned officers can exercise little control other than to restrain the men from shooting high.

In all these advances the firing line has been encouraged to move from one position to another by timely reinforcements by the support and reserves, until all the men of the leading companies are engaged. If the enemy still resists the battalion reserve will be called on, and, if practicable, a covered position sought for these troops so near the firing line that a short rush will carry them to it.

The rapid fire by the advance companies is continued and directed to the best advantage, and when its effect begins to tell upon the enemy the lieutenant-colonel orders forward one company of the battalion reserve, in close order and with bayonets fixed; this company having reached the line, the lieutenant-colonel commands, *Charge*; the trumpeters sound the charge, the officers and men cheer and rush upon the enemy's position, the men of the firing line fixing bayonets as they advance. If armed with repeating rifles, the magazine will be reserved for this rush.

If the assault fails, the firing line, now composed of three companies, by its rapid fire and any hastily constructed cover holds the ground gained, while the fourth company is quickly brought forward and the charge executed again as before.

If he deems it necessary the battalion commander may order the fourth company into action at the same time the third goes forward, but it must not be ordered into action unless its presence be necessary to success. Otherwise it will be held in rear, either to repulse a counter attack, especially one on the flank, or to serve as a rallying point for the advance companies should they be driven back. When ordered to the firing line it should be replaced by a company of the battalion in rear belonging to the same regiment.

Even in case of success it will be necessary to guard against a counter attack, and to this end two companies will pursue the enemy only until a favorable position be reached from which to open fire, while the other companies rally and in close order again move forward to the firing line. If all four companies have participated in the assault, it would be well for the third and fourth to continue the pursuit, while the first and second rally as just stated.

If the enemy retires in confusion, cavalry may charge to great advantage.

If the attack fails, or the position be lost by a counter attack, the battalion of the second line, already prepared, deploys and gives the retiring line time to rally and reform in its rear. Circumstances must dictate whether the reserve battalion, now in front, renews the attack or remains on the defensive.

It will be observed that in the earlier stages of the action the attacking force is so disposed as to expose to the enemy's fire only so many men as are capable of inflicting loss upon him, while the remainder benefit as much as possible by cover. It is also apparent that the intention is to first break down the more serious resistance on the part of the enemy by fire, and then to assault his position with numbers.

To permit each skirmisher to use his rifle with the greatest effect at long distance firing, say from 500 to 800 yards, intervals of at least two and a-half yards should be allowed.

If an advantage be gained by the firing line, it should be promptly pushed by the support and reserves, if possible, before the enemy can either rally or reinforce his line. Again, the character of the action may be such that the battalion will be overwhelmed by the enemy's fire before it closes sufficiently near to make the final rush; if this be so, the third battalion should move promptly to its relief, and at the same time one from the division reserve will be brought forward and posted as a regimental reserve.

ON THE DEFENSIVE.

Except that the distances between echelons may be diminished and the firing line made stronger at the commencement, the normal formation of the battalion will be the same as on the offensive; the skirmishers commencing the action.

The safety of the defense lies in a well-directed fire, which should be applied to prevent the enemy from reaching a close position. Each successive advance will be met with an increased fire, and the energy of the attack broken before the enemy closes near enough to assault; hence the reserve companies join the firing line before the enemy prepares for the final attack.

Ammunition can be supplied more easily than when acting on the offensive, and consequently fire may be opened at a greater range.

If practicable, a strong position will be selected and strengthened by artificial defense before the enemy arrives.

Acting either on the offensive or defensive no opportunity should be lost to strike an exposed flank. Ammunition will be supplied the firing line, and wounded men taken to the rear by men of a special corps; those of the fighting line should not be sent back for either purpose.

Armed with the breech-loader, a skirmish line should resist cavalry, if fire can be brought to bear at good range; if it cannot, then the men should rally in small groups and the supports and reserves in circles. The most convenient group will be that of the unit of manœuvre, as our "set of four," or the squads of different strength in the various armies.

The battalion commander will avoid a passive defense by taking the offensive whenever practicable; a favorable moment will be just as the enemy moves forward to his final assault. At that moment a company of the reserve may with advantage be directed against the flank of the enemy, while the line in his front rapidly increases its fire. In a like manner a flank attack may be met by a reserve company.

Should the first battalion meet with disaster and be forced to give way, a battalion of the second line deploys, and, as soon as the first has passed to its rear, it endeavors to take the offensive and regain the lost position.

To meet an emergency, positions to the rear should be selected in advance, and if compelled to retreat the defense will withdraw by echelons, resisting as much as possible to enable the main body of troops to take the formation in "column of march." A rout may be avoided by posting the best troops as rear and flank guards, and having these act in conjunction with the accompanying cavalry and artillery.*

For discussion on this paper see "Comment and Criticism."

REFORM IN ARMY ADMINISTRATION.

BY BREVET LIEUT.-COL. J. G. C. LEE, U. S. A.

QUARTERMASTER'S DEPARTMENT.

THE Army as it stands organized to-day is the result of long experience. From its creation to the present time, legislation, stimulated by necessity, and the knowledge gained by officers in active service, has sought to bring it to the very highest state of perfection. The theory of the Government and the spirit of our institutions declare the absence of necessity for a large standing army, but demand that there shall be a thoroughly organized nucleus around which the volunteer forces of the country may rally in case of war, and to which they may look for prompt and vigorous instruction. Hence ample provision is made that the means of raising, equipping, arming, drilling, supplying and transporting large bodies of men shall be always ready and at hand. Actuated by these views, the country maintains our small land force, with what would otherwise be a somewhat disproportionate number of staff officers.

If any vital principle be especially applicable to such an army as ours, it is that its instruction in time of peace should be its best preparation for war. Not only should the system of its management be clear, comprehensive and vigorous, but the system should be capable of expanding to meet the necessities of the largest forces, and of being easily understood by the ordinarily intelligent man from civil life. In the late Civil War, the Army of the United States grew from a few thousands to several millions of men, yet the capacity of each and every branch of administration was found equal to the strain thus laid upon it. And when the War was over and the millions again dwindled to the thousands, the various departments contracted, proportionately without friction, jar or confusion. There must certainly have been great merit in an army organization that exhibited such extraordinary powers, and such admirable capacities for the peculiar needs of the country.

But the Army of to-day has drifted in some measure away

from the simplicity and vigor of the system that then characterized it. Slowly and at intervals so as to be scarcely noticeable, innovations and encroachments have been made, from one cause or another, by this and that agent, to correct some real or fancied abuse or irregularity, that have largely complicated the machinery of administration and seriously encroached on the simplicity, the effectiveness and even the vigor and vitality of the Service.

I am not unmindful that advancement in any direction means change in the order of things, and that the rules that govern at one period are not, in the nature of things, wholly applicable to any succeeding period. With the many inventions and the great progress in the arts and sciences, made day by day, changes must of necessity ensue. But what I urge, is, that *our* system should *always* be kept simple, comprehensive, clear, vigorous and effective, instead of in any respect cumbrous, intricate, diffuse, weak, and lacking in efficiency.

Some of the later requirements, in the way of reports, have grown out of single instances of deception practised by one dishonest agent. I have in mind, one paper to which I shall refer later on, required weekly and monthly of all disbursing officers, just because a great defalcation had been skillfully and successfully carried out by a most plausible officer of good address, whom everybody trusted. And so, an additional regulation was made and has now been many years in use, involving a great aggregation of time and labor, because of a past crime not likely to happen often, yet without, so far as I know, a single detection of a like crime, and which a subsequent defalcation proved, could be as successfully manipulated as any other part of his crime.

To the reformation of all administration, wherever such can be made, in the interest of simplicity and effectiveness, the to-day student of army affairs should apply himself as a self-appointed task.

It should not appear in any degree singular that army laws and rules should require revision, and rearrangement from time to time. There is scarcely a commonwealth of the Union that has not, now and then, found it necessary to collate and codify its laws, and even to amend its very constitution.

By reformation I do not mean an entire abandonment of all existing order and regulation. By no means. On the contrary, what is good, what experience has proven to be of value, should

never be lost sight of, but should be held to with a grasp of steel. It is the *unnecessary*, the extraneous, the non-essential, that I strike at.

It must not be forgotten that the existing state of things has been a matter of slow growth, is the accumulation of vast experience, has a strong hold, and is in very many respects most sound and excellent. Wherein it is faulty, it is, for the very reason of its age, like a chronic disease, and presents great obstinacy to treatment. And so, one cannot help feeling deeply impressed with the gravity of the step, when he assails it in any respect. Indeed, I desire to be plainly understood, as not aiming a blow at the whole structure, but at the errors and imperfections which sap the vitality of the body—as a physician would remove any abnormal growth which, if left untouched, would, in time, steal away the life of the patient. And I further wish to be understood as approaching the subject with the most profound respect for what past experience has given us and laid down for our guidance. He would be a blunderer indeed who should attempt to ignore the teachings of the past, in any direction.

For the government of the Army, there are: 1st, the laws of the land; 2d, the Army Regulations and decisions; 3d, orders.

The laws of Congress reach everywhere, and apply to all.

The Army Regulations, with decisions thereunder, reach the Army, but do not always apply alike, though such is their evident purpose.

Orders may be said to apply unequally, inasmuch as they are from many sources, of varied views and dissimilar conceptions.

In different geographical departments different practices obtain, different orders of things govern. The methods are not uniform.

Certain powers are delegated to certain officers, whether of command or administration. They are not the same in different places. One officer may do a thing in one position that another officer in a like position will not be allowed to do. Hence it is that officers do not tread their ways wholly confidently, that uncertainty and indecision arise in cases when certainty and promptitude are of utmost importance, that we all “feel” our ways, more or less, and that we sometimes hesitate to act upon our best judgment through fear that it may be misunderstood or disapproved.

It must be plain, however, that in the main the government

of the Army should be uniform everywhere, that the subordinate may clearly know his duty and what is expected of him. Hence the need of a system that will work alike everywhere, dividing the duties as it spreads outward, yet centring them in one head, from which may spring general control, but leaving detail to be provided for by divisions and subdivisions.

To my mind it is to the office that certain rights belong and not to the man who holds it, apart from such office. The authorities have certainly the right to select their man, but once having selected, they are bound to give him full faith and credit so long as he deserves it, together with all the rights that belong to the office. There should be no "fish of one and flesh of the other" business anywhere.

All observant men must have seen of later years a strong tendency toward the centralization of all the details of control. No thoughtful person would deny the necessity of central general control. All great enterprises of whatever kind or character must have a head, and especially is this so in army matters. But when that control descends to each little detail, it is in imminent danger of being overwhelmed, of letting important questions go without the consideration they merit, while giving time to some trifling matter which a proper division of labor could have most beneficially delegated to a competent subordinate.

I believe there should be a rearrangement, readjustment, reformation throughout, from the top down to the remotest corner, embracing greater simplicity, more vigor, careful definition and far-reaching clearness.

Those who have been even slightly conversant with the affairs of the War Department for the last fifteen or twenty years have been aware that strained relations have on several occasions existed between the Secretary and the general in command of the Army, arising in whole, I judge, from a divergence of conception on the part of each of the duties of the respective offices.

Had the line been clearly drawn, either by Congress or the President, such contentions would likely never have arisen, and the differences between these exalted officers, necessarily more or less hurtful to the Army, have been impossible. It may be said that it is an impossibility to define the boundary of authority and action, that no agreement could be reached, that neither Congress nor the President would be willing to determine the lines. And so matters go on in an indeterminate way, har-

monious in the main, because of mutual respect, rather than from any well-defined boundary of right. Well would it be for the country and the Army if the limit could be defined and the point at which the subordinate could always confidently take up his duty be plainly stated.

No time would seem more propitious for such a step than the present. With a statesman of profound strength, ability, industry and application, himself once a soldier of rank, at the head of the War Department, and a distinguished soldier in command of the Army, who has displayed conspicuous ability in the administration of the office of Secretary of War, there would seem little difficulty in arranging a basis of guidance clearly marking out the lines and boundaries of action that would become a precedent for all time.

Following the same course, all questions as to authority, rights, duties and privileges of command should be first thoroughly analyzed and determined, and then sharply laid down and defined, and this should be done for every command, from the highest to the lowest. It has been done, to some extent, in the last Army Regulations, but the scope may profitably be enlarged and amplified. I do not assume to say how this can *best* be done, but it seems as if by first asking the views of all general officers as to the scope that appears to them warranted for divisions, departments, districts, posts, regiments and detachments, and then of many of the most competent and intelligent of subordinate commanders, and submit these to well-selected boards, the best of results may be reached. In like manner carefully appointed boards may work reform in all branches.

But while the divisions and sub-divisions of command are many and sometimes intricate, each and every one of them is again associated with all the subordinate questions of administration and supply, and here it is that the staff steps in as a most important adjunct and factor. As I have said, experience has effectively taught that the best results come through a division of labor, and the staff of our Army, as now constituted, though under the control and command of the officer it may be with, yet takes from such officer all the detailed care and responsibility of supply, leaving him free to carry out the larger and more important functions of his office, untrammelled by the perplexities and petty annoyances that beset management in detail.

So excellent is our staff organization that the armies of the

old world have largely adopted it, and have, step by step, engrafted portions of it into their military systems.

And yet it is in the staff departments that the greatest need of reformation seems to me to exist to-day.

I know I should call down upon me adverse opinions and strictures, from many sides, did I assume to go into each one with a probe to ferret out its remotest corners of defect and unhealthfulness. No one person has the right—even had he the ability—to do that. Each department must be left to work out its own results. My aim has been to deal with my subject in a general way, to direct attention to it, to make any suggestions that might seem proper, and to touch only on such salient points as must be apparent to all.

For instance, who will stand up and aver that the allowance of rooms, as now prescribed by Army Regulations, is at all commensurate with the present requirements; who maintain that the allowance of baggage on changing station is adequate; who elect to defend our voluminous papers and circuitous methods of purchase and supply; who proclaim that no more simple transportation system may be adopted? Or who will uphold a system whereby the foods supplied shall not always be the most ample as to number, and the freshest and most excellent as to quality? Who would defend impurity of medicines for the sick; or the supply of poor guns and ammunition for the soldier to do battle?

Looking back, we find that many of our regulations and allowances date far into the past, behind the invention of the telegraph, the telephone, the adaptation of electricity to general use, the daguerreotype with all its developments, and many kindred inventions which have in later years revolutionized the conditions of society. Some of these allowances go even behind the general use of railroads and steamboats. They were based on another era of civilization, on limited and costly transportation and the scantily-supplied treasury of a nation struggling into existence and growing into power and influence.

But the railroad and steamboat are now everywhere; transportation is cheap; the country is rich, powerful and prosperous; its place among the nations is assured; the people are well to do; and they no longer need or wish that their servants shall be pinched by the conditions of earlier days. The nation has cast off its swaddling clothes, and stands in its full-grown manhood

and strength, ready to care for its defenders and wards, ready to bear all burdens its necessities demand of the individual.

And yet we are restricted to-day—to allowances of rooms, and of transportation of baggage on change of station that would be ridiculous were they not so oppressive. Imagine a lieutenant, of 15 or 20 years' service (and there are many such), married and with a family well on the way to manhood or womanhood, living in one room for quarters and one for kitchen; or a general officer transporting the household of his rank and station on an allowance of 2000 or 2500 lbs. Where shall we find more absurd or inharmonious conditions?

Happily the regulation in regard to rooms has, by its own absurdity, become a dead letter, and most officers are pretty well provided for, though in open disregard of the existing allowance.

But it is far different in relation to baggage allowance, which, being so greatly inadequate, leaves officers subjected to great and oppressive additional expense whenever called upon to change station, at the beck and call of the Government, sometimes as often as three and four times a year, and very frequently as often as once a year.

The allowance at present is just about one-fourth of what justice demands it should be, and will barely transport clothing and bedding, let alone furniture and housekeeping appointments. Of course, if increased to what it should be, there would be occasional instances where an officer would not need his full allowance, in which case he should be restricted to what he actually owns and takes to his new station. As it now is, the officer has frequently to sell his household property (often gained by stinting economy) at ruinous rates, for the reason that he is unable to pay for the transportation of his family and his baggage at the same time. The allowance is not a matter of law, but of regulation and within the control of the War Department.*

The truth is, many regulations and allowances are determined by officers, not subject to change themselves, and long removed from close contact with the Army and its necessities. In their sometimes mistaken zeal to economize they lose sight of the fact that the nation does not seek to gain by imposing losses upon

* Since writing the foregoing in relation to baggage, the allowance has been somewhat increased, but is still far below an adequate or reasonable amount.

any citizen, and that it is ever ready to treat its servants with liberality as well as exact fairness.

Consider also the allowance of stationery and mineral oils. What will the persons most interested say of them? Will any one pretend to support the theory that a commander of a district or brigade can conduct his official correspondence for a whole quarter on 12 quires of writing paper and 200 envelopes, or of a post of not less than five companies on 10 quires and 150 envelopes, or of three or four companies on 8 quires and 120 envelopes, two companies on 7 quires and 100 envelopes, and one company on 6 quires and 80 envelopes? It is true that extra issues are provided for, but they must be approved by the War Department, thus requiring the action of one of the great executive departments of a Government, controlling a continent, on an extra issue of writing paper costing from 12 to 18 cents per quire, or envelopes costing 27 cents per 100; the cost of the whole authorized issue of these articles for a brigade being but \$2.35 for three months, or 78 cents per month, and for the other commands enumerated, in like proportion; while at the same time, officers of the Inspector General's, Pay and Quartermaster's Departments, subordinate to the respective commanders referred to, may use all that is required for their public duty.

Will it be said that lamps and mineral oil provided at the rate of one burner to every ten men, one burner to each office room, four burners to each library room, and so on, with oil at the rate of 2 ounces per hour for each burner, provide sufficient light? We all know that they do not. And though an increase is afforded through the flexible condition as to hours of illumination, it is done, to a certain extent, by stretch of prerogative.

The cost of oil with transportation added, fixes the average expense of each burner at about $\frac{3}{4}$ of a cent per hour, at which rate, it would seem, an adequate number of ample burners might be allowed.

In the cases both of stationery and oil, the necessary amounts are had, but in a measure by evasion, the effect of which has a lowering tendency on the high moral standard so stoutly maintained by the Army.

I assume that no one, not even the most conservative of all red-tape adherents, will take the ground that unnecessary papers should be made. And yet, I do not think the careful observer of present systems, if he be at all possessed with the spirit of

progress, can escape the conviction that much of our paper work may be advantageously dispensed with. As I have before stated, some of them are the outgrowth of particular and individual cases, and serve no important purpose in the general management.

To illustrate this point I refer to the weekly and monthly statement of funds, a paper devised and instituted for the purpose of detecting defalcations, but which, so far as I am advised, has never in a single instance served its purpose. Yet we burden our officers, the mails, official correspondence, the depositories and the files with these papers on an average five times a month, from every disbursing officer.

The Account Current is rendered monthly. Is it too much to trust an officer one short month? If so, he should not be trusted at all. And if, at the end of each month, he is required to promptly file his account with all the vouchers to sustain it, through which a fraud or an error may be definitely discovered and determined, should not that be sufficient? The bureaus of the War Department and the Treasury Department should be the main guards and protectors against fraud. Let the work of these be brought up to date, and detection will follow crime, accurately and surely, but it can never be done through the medium of a summary which affords no accurate information.

It seems too, that many of the papers now required at Department and Division Headquarters, may be omitted by simply providing that those to be filed in the War Department shall pass through the respective headquarters for remark and revision. Others, such as the estimates for stores, may be simplified, and still others dispensed with.

I have long held the opinion that property vouchers may safely be reduced in very nearly one-half, without impairment to the public security, and have on two occasions submitted projects to that end.

With the many conditions surrounding the transportation service, especially those pertaining to land grant and bond aided railroads, it has long seemed that our shipping system had been brought into the best possible state of perfection. But it is still complicate and cumbersome, and can, it is thought, be simplified, with equal protection to the Government, and accelerated service to the departments.

Circuitous, clumsy and slow methods of purchase and supply should be shortened, simplified, made prompt and effective.

Think of the demand made upon the foresight of an officer when it is required that he shall provide for the wants of his post, itself a good sized village, by requisitions made two months in advance for the period for which they are required, and then reflect on the delay in making purchases under our system even after such be authorized.

I can see no advantage whatever to the public good, and every disadvantage to the Service, in the delay enjoined under our methods of making purchases. For the larger lots of supplies, which may easily be foreseen and provided for in advance, and which admit of wide and general competition, a longer period of notice to bidders may properly be held to. But for the smaller lots of miscellaneous stores required at posts, for which competition is ordinarily limited to a single place, three days' notice by circular is better than ten or twenty, secures more attention from dealers, and enables the purchasing officer to more promptly meet the need.

Services, other than personal, must be contracted for in the same cumbersome, tardy way.

An amusing story is told of the strictness with which the departments hold officers to these rigid rules in relation to procuring supplies and services under advertisement and contract. Some valuable Government property stored on or near a dock had taken fire. No other means being available, the responsible officer engaged the services of a fire-boat to suppress the fire and save the public property. The voucher covering payment for the service was suspended for the reason that the officer had not invited bids and entered into a contract according to law.

How long could the existing conditions last in time of war? Not a day. They would necessarily fall. Unwieldy and unbusiness like, they would speedily give way to simple, direct and effective methods. Yet these are the conditions under which, in peace, we train our young men for war, establishing in their minds delay and circumlocution instead of directness and promptitude; clumsy methods in the transaction of affairs, instead of simple and effective ones.

Before passing from the subject of provision for supply, I would ask, is it best that the foods for the Army be sent so infrequently to posts, or at such distances from the markets as to make sure they will be stale before they are consumed? Is it liberal to restrict the list to the extent of not providing the ordi-

nary commercial foods and table luxuries? If losses have arisen, rather through an over supply of quantity than because of the non-sale or issue, is all need of such articles to be denied the consumer who has a right to expect everything in reason? I ask these questions in a spirit of justice rather than of criticism, and to indicate the view taken of the matter by officers stationed at remote places. I do not think it too much to say that near commercial centres, the Army relies more on the merchant for table necessities and luxuries than on its authorized source of supply.

One requirement of our system that appears to me to possess most objectionable features is one imposed by law. Construction must, when practicable, be done by contract. As it is nearly always practicable the contract method mainly governs. But it works disadvantageously to the Government, inasmuch as it entails the poorest possible class of workmanship that can be made to pass by the contractor. It would seem that public buildings should be built of the best materials and in the most substantial manner. The contract system does not secure this, but rather the contrary. While it is possible to inspect materials as they are brought upon the ground, it is absolutely impossible to secure excellence of workmanship in all the details without many expert inspectors, the cost of which would be too great, and the risk of collusion too dangerous. Without constant expert watchfulness, at every point and every moment, the work will be slighted. The very system is a premium on fraud, and adverse to the public interest. It is too much to expect of the average contractor that he will put more expense on a work than he can get along with. The result is, we get a poor class of mechanical talent, have to put up with bad workmanship, and reach imperfect results. The draughty houses, with yawning outside cracks and joints and gaping inside seams and fittings, too well attest the truth of these remarks.

I have personally had occasion to make openings in the walls of an important public edifice, constructed by contract under the supervision of a most competent and careful officer, the workmanship of which was so bad that it was a wonder how they stood at all.

I cannot doubt that a far better and more substantial class of work, at little if any increased cost, would be secured for the public service throughout, if officers were required to employ mechanical talent by the day or month. Men so employed would

faithfully carry out the orders given them as to the character of the work, from the head down to the lowest, knowing that their very places depended on it.

It will be said that it is our public policy that the public purse must be open to all competitors, and this is, beyond question, the true policy in all matters when the article to be obtained is one that can be readily judged by any well-known and established standard. Mechanical skill is not such an article. While it is easy to determine whether or not a man does good work, it is impossible to make sure that he will do it when tempted by greater gain for doing it imperfectly.

One system begets fraud and imperfect results, the other fosters honesty and excellence of workmanship and secures the best outcome.

I must believe that if these conditions were plainly pointed out to Congress, it would amend the law in regard to the hire of skilled labor.

There will be no denial that the Treasury must be protected against dishonesty to the fullest extent, and there can be little expectation that the affairs of the public should be conducted strictly, as simply and directly as private matters.

But the public may well pattern in many respects after the system, the order, the simplicity and yet withal the stern vigor of many of our private gigantic establishments.

It will be said that one great difficulty that lies in the path of reform is to get the necessary legislation, but my observation leads me to the opposite conclusion that Congress is ever ready to pass beneficent laws when it is plainly shown that the need exists.

It is not alone to legislation we must look for all benefits; they must in a large measure be brought about by ourselves.

What may be done in the way of reform has been signally illustrated in the pension or medical record division of the Surgeon General's office during the past three years, under the direction of Captain F. C. Ainsworth, Assistant Surgeon, U. S. Army. This division has now been consolidated with the pension division of the Adjutant General's office, and the whole is known as the Record and Pension Division of the War Department. When Captain Ainsworth took charge of the division named, of the Surgeon General's office, it was almost hopelessly in arrears, yet under the system he inaugurated the vast work

has been brought to date, so that inquiries formerly requiring sometimes six months and sometimes a year for answer, can now be answered on the day of receipt. In a similar manner, it is stated, that cases relating to pensions in the War Department that were 40,000 in arrears on July first last, have been brought up to date under the management of that officer.

It is exceedingly gratifying to note that a decided step has been taken in the direction of examination for promotion, recommendations to that end having been embodied in the reports of the Secretary of War for 1886, 1888 and 1889. The measure has long been urged by some but vigorously opposed by others. It has, however, been steadily gaining ground and now seems likely to become law. The examination proposed is not a mere educational one, but is broad in its application, and bears chiefly on the officer's fitness for the higher position, physically, mentally, morally and professionally. I firmly believe that the measure once adopted will have a decided and lasting benefit on our service. Officers will know that their positions are endangered by slothfulness and dissipation, and insured and strengthened by study and application to their duties. Incompetent, inefficient or disqualified officers should be weeded out with relentless hand. Worthy material alone should be retained. Sentiment is one thing, public safety another. The man who has become fairly disabled in the Service should be forever cared for; on the active list, so long as fit, on the retired list, when unfit; but the one who has impaired his mind or body by excesses should be unhesitatingly disposed of.

Lineal promotion throughout each arm of the Service, though impairing regimental *esprit de corps*, yet seems a fairer and better system than the present one, and will doubtless soon follow.

Increase of pay of the higher grades of non-commissioned officers will undoubtedly improve the general bearing and conduct of enlisted men, and will likely be provided for at an early day.

One great reform, which it seems all important to reach, is that all selections for promotion shall be based on merit alone, and not on political or social influence. This will be, in a measure, reached by the provision for examination for appointment and promotion, but the rule should be laid down and held to with unswerving fidelity, that no officer shall be selected for advancement whose record does not give abundant proof that he is

especially qualified for the position he is to be thus elevated to.

Reviewing our existing system in its entirety, one cannot fail to be impressed with the belief that we have diverged very broadly from the purpose for which it has been brought into existence, viz.: the main prop and support of the country in case of war. For that purpose solely are we the employed and paid servants of the people. To that end should we devote every talent and energy in our possession. We must not allow ourselves to be absorbed in means and forget the end; to pursue the shadow and miss the substance; to lose sight in the provision for the present of the main object in the future; to bury ourselves beneath a mass of cumbersome, intricate, inefficient machinery, with the expectation of its serving to advantage when we are compelled to throw open our lists to partially or wholly untrained volunteers from civil life.

I am such an admirer of the genius, originality, inventiveness and capacity of our country to devise and formulate for itself in every direction, that I refer to a system of another country with reluctance, still, I advert to the great simplicity of the organization of the German army throughout, yet having vigor and system in all its parts. The combination of battalions into brigades, brigades into divisions, and divisions into corps is most simple and uniform in all branches of that service. The methods of mobilization, of reinforcement, and of supply are comprehensive, clear and alike everywhere. And above all, as is stated by one of our ablest young military writers, "the secret of the efficiency of the German military system lies in the division of responsibility, and thorough decentralization, by which every man, from the monarch, to the private soldier, has his own especial part to perform."

What I urge is a simple, clear, comprehensive, vigorous system, uniform, easily understood, clearly defining all duties, devoid of circumlocution and delay, inspiring confidence, demanding precision, tending directly and mainly, but surely, toward the end for which the Army has been created and is sustained—the safety to this Union of all the future.

The origin of reform should be from within rather than from without. It can scarcely be carried out by the Secretary of War, whose term, as a rule, is not a long one. The Army is a permanent body, whose officers are daily gaining experience and growing in knowledge of their profession. To them, and to them

only, have we a right to look for whatever of improvement and advancement we are to enjoy. From them we must expect that study, research, thought and result so necessary to keep us abreast with the front ranks of national advancement. The needed reforms will surely come; not perhaps as we may wish them, all at once, but possibly slowly, surely, in a one-at-a-time way. They may even arise in one branch or department long before in any other. When the man appears, his work will be done. He will leave his impress graven deeply on the face of our system. Patiently and trenchantly he will delve, until the whole fabric, root, branch and body are laid bare to his discerning eye and judgment. Profoundly will he consider the past, its teachings, its record and its commands. He will scan the present and the future with their needs. With infinite pains he will weigh, and group and consider, and then decide and formulate.

As the skillful gardener prunes his trees, he will lop off a branch here, uproot a stem there, destroy every offshoot impairing the health of the tree.

He will mercilessly insert the knife to prevent decay and restore health. He will clear away all rubbish, but he will conserve all that is sound, with fostering care.

Somewhere is being perfected his broad comprehensive brain, somewhere is being gathered the knowledge, grasp and experience to fit him for his great mission.

Whenever he comes and wherever he appears, we shall recognize him, and do him homage.

It is perhaps too much to hope for any one man in any one period to accomplish it all. But one man can put forth one idea and another a second and so on. In a multitude of counsels there is wisdom. The coming man who is to influence our army administration most, will be he who can best aggregate the wisdom of those by whom he is surrounded and supported. And after all, the coming man in our Service, is the aggregation of manhood, intelligence, study, force and energy of the many, stimulated by lofty patriotism and deep seated love of our profession.

THE PLACE OF THE MEDICAL DEPARTMENT IN THE ARMY.

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THE object of this paper is to discuss the duties and place of the Medical Department of the Army, to invite attention to features frequently overlooked or not appreciated by the line, especially to point out defects in the system, and to suggest changes looking to the greater efficiency of the whole Service.

The profession of arms, like its counterpart the church, is among the most conservative of institutions, but nevertheless it does move. Otherwise our friends of the sister service would still be merely sailing masters and nautical experts, non-combatants manipulating their ships so that the soldiers afloat could carry on their warfare, the drivers of the light artillery would remain hired civilians, running away when most needed, the pioneers would be, as once they were, impressed laborers, and the adjutants general might remain cunning scribes, clerks to reduce to writing the orders of chiefs too ignorant or it might be too proud to write.

It will not be disputed that those rendering medical service in the mediæval armies occupied very inferior positions, and it is not worth while to trace the path by which their European successors have reached their present improved but not yet altogether satisfactory place. We are concerned with present problems and not with that limbo into which plate armor and feudal caste, barber surgeons and marshals of the verge, smooth-bores and authorized rapine have fallen, and into whose shades muzzle-loaders, stocks and other effete conceptions have retired before our own eyes. Our attention is occupied with the United States medical officer of to-day, and it is proposed to defend the affirmative of the proposition that he is an essential part of an efficient army, and as a military factor in it is entitled to precisely the same consideration and respect on account of his position as are accorded to any other functionary of similar rank.

I know that I shall at once be wounded in the house of my friends by the cry, directly, or as a quotation, "I am not a soldier, I am a doctor." I have heard it more than once. And those gentlemen of my corps who make this disclaimer will generally go on to maintain that a doctor is a much more useful, dignified and important person than a soldier, of whatever grade; always closing with the explanation that the President can make any man a colonel, but that he can make no one a doctor, and further can give no doctor a place in the military service. In other words, that the military doctorate is surrounded with an intellectual radiance before which the glory of arms must pale its ineffectual fires. Similarly, considerate line officers will explain their uniform use of the civil title as a compliment to the doctors, whom they affect to believe prefer it, but when questioned promptly admitting that they themselves do not look upon doctor as a greater titular honor than colonel, major, captain or lieutenant. As between medicine and war, the art of healing and that of logistics, how far by each the world has been influenced, history has been made and nations created, it is not necessary to discuss just now, but this point of comparative compliment in the titles will be brought up later. But the general view, expressed more or less frankly, is that medical officers are civil functionaries, non-combatants attached for certain utilitarian reasons to the armed forces of the State, and, at the very utmost, officers of the staff with no inherent authority, who are especially and properly debarred from more than nominal control over the rank and file, and have even that only for limited purposes and with restricted power.

There is no more doubt that originally military physicians were civilians, more or less closely attached to the army, as are the acting assistant surgeons of to-day, than that the adjutants general have been evolved from secretaries and the supply officers from purchasing agents. And, further, in our own earlier Service these medical attachés were practically political appointments, sometimes of great excellence and sometimes of none. But in 1834 the corps was reorganized, or, more properly, organized, on a distinctive basis of merit and merit alone, open to all respectable comers, but guarded from unworthy intrusion by a barrier of examination that, with the lapse of time, has gradually grown stouter and higher. There has been but one instance since 1834 of admission to the Department except as then prescribed.

The military foundation upon which the Medical Corps rests is the enactment of February 11, 1847, that the rank of its officers should be arranged upon the same basis as then determined their pay and emoluments, with the proviso that such rank shall not entitle them to command in the line or other staff departments of the Army. This proviso although apparently placing a special limitation upon their military functions really establishes an equality with other staff officers, none of whom is eligible to command outside of his own department without special assignment. The opinion, by whomsoever held, that medical officers are civilians and not military men is certainly disposed of on all technical grounds by a study of the act referred to, and an examination of the commissions that they bear. If they are not technically military personages, then are no staff officers.

The other and more important point that, notwithstanding their commissions, they are virtually civilians, is held only by those, either without or within the corps, who entirely misapprehend the extent of their sphere. A medical officer has certain and very important clinical duties which in great part, but not altogether, are common to civil physicians. Their performance can hardly detract from his military character, else see what follows. A quartermaster buys horses as might a drover, and erects houses as might a builder; a subsistence officer purchases and distributes food, as other purveyors; an engineer for years together improves water-ways, establishes boundaries and superintends light-houses, as do other engineers not commissioned; and an ordnance officer may see no soldier and wear no uniform for long periods while building guns that, it is not sacrilegious to say, certain civilians also do with great skill. All of these gentlemen would feel much aggrieved to be told they were no soldiers, because they were devoting their time to work identical with that of civilians. Why, then, should a medical officer, a part and admittedly a very important part of whose duty is the care of the sick, be looked upon as a civilian and as such alone, merely on that account? It is certain that these and other "non-combatant" duties do not in themselves detract from the martial qualities of the actors; for, having special qualifications, a captain of infantry has been known to act for a post surgeon, and a captain of cavalry has efficiently discharged under detail the functions of medical inspector of an army corps, without vitiating their line commissions. I know that extremists hold that what is

not on the firing line is an appendage almost parasitic, if not destructive, and that the so-called "effective force" is the army. They would class all the staff departments together as evils, possibly necessary, but certainly evils. Campaigns planned on paper and in peace are chiefly concerned with an enemy to be outwitted and overpowered, forgetful that an armed force alone is primarily helpless and later self-destructive—earth-borne by its own weight. The various staffs vitalize, nourish and render mobile the commands through which they are diffused. To go back no further than the Army of the Potomac, a trio reappears unheard of by most of the rising generation and to all not participants only names and shadows, but very dear to the men whose muskets and sabres rescued an imperilled nation. Seth Williams, Rufus Ingalls, Jonathan Letterman! One was not behind the other; administrative and executive giants, whose powers and their exercise the great organizer, McClellan himself, need not hesitate to admire! Had the successive chiefs of that often ill-commanded army possessed the broad military grasp of any one of those men, some campaigns might have had other endings. No American soldier can study American war and venture to ignore such allies of the line, such essential parts of the whole, as were those superb staff officers. Nor is there reason to doubt that their successors are now in commission, awaiting the touch of war to cast off their confining trammels.

But beyond the inferior and auxiliary state of "mere staff," to which many would consign them, civilians in good faith and others in a derogatory way often describe the medical officers as non-combatants, and these last use that expression in a different sense from that as applied to a quartermaster or a subsistence officer. Non-combatant seems meant to represent a passive agent, one who can take no credit in victory and has no share in defeat, a neutral if not a neuter functionary who is present in some transcendental capacity and is mysteriously protected from all risk. Curiously, some who concede all that is claimed as to the *fact* of the commission ignore its essentially military character, owing to this assumed limitation. The assumptions upon which this limitation is based are that medical officers are simply and only surgeons (as they are unfortunately mis-named), whose entire duty begins and ends with the care of men who may be wounded by the chance of battle, and that this duty is always discharged at the rear and in complete safety. Along with this is the further

notion that however devoted "doctors," civil or military, may be in the presence of grave disease, their profession *per se* disqualifies them from essential participation in those stirring events of camp and field that yield martial credit. Indeed, besides the non-combatant fetter that cripples its wearer in campaign, the professional mantle itself is supposed to incapacitate those whom it envelops from a successful race even for civic reward. Attention is invited to these disparagements as a group, regardless of the order in which they have been stated.

A late and excellent authority makes these definitions:

"A combatant is a person who, with the special authorization of his government, takes part either directly or indirectly, in the operations of war. The term includes in addition to the troops of the line all staff officers, surgeons and chaplains, officers and employés of the supply and transport service, etc., etc." "A non-combatant is a resident of a belligerent state who takes no part in the war."* These definitions are correct and their general acceptance would place the medical staff at least upon a proper formal basis. But definitions, however exact, will not at once replace misconception, and the impression continues to be fostered that upon a medical education no military superstructure can be built. Nevertheless, the commanding general at Bunker Hill, who fell with the redoubt, was known to his troops simply as Dr. Warren. General Mercer, who died in victory at Princeton, was a surgeon at Culloden, was wounded under Braddock, and actively practised medicine in the interval between the French and Indian War and the Revolution. Col. Edward Hand, of the Pennsylvania Rifles, later a general officer and after the War a member of Congress, was a medical practitioner before the call to arms. Either he or a namesake of like rank was at one time spoken of as surgeon-general. Dr. William Eustis, a distinguished medical officer of the Continental Army, was Secretary of War from 1809 to 1812, besides holding other important offices of state. To pass to the Civil War, we find one officer who was an assistant surgeon when it broke out become, with continuous service, a colonel of regular infantry, during the hostilities a general officer commanding a division constantly in the field, and retired for wounds received in that capacity. To the intelligence and military sagacity of another assistant surgeon the Army is indebted for the best organized system of military signals, and one that under the test of

* Davis. "Outlines of International Law," pp. 232-3.

war was both efficient and unique. I have personal knowledge of at least two officers now in the line, and possibly there are others, who were physicians by profession; and doubtless during the War there were many more. The late distinguished Surgeon-General Lawson was a lieutenant-colonel of volunteers in the Florida War, still holding his medical commission.

There is evidently, then, no inherent incompetence that unfits physicians as such from learning the Art of War and to command troops as efficiently as any other men not specially bred to it from youth, with the probability that their trained minds would acquire the principles more speedily than raw civilians lacking both military and scholastic culture. By the Art of War and the exercise of command I mean the higher military functions, and not the mere memorizing of drill formations that every smart sergeant knows as well as his officers. The reason why professional men so seldom seek line commissions is that few, who by prolonged and costly study have acquired a special education, are willing to discard it for any pursuit, however acceptable it may appear at the time. This was illustrated within my knowledge during the War when a peculiarly intelligent and gallant surgeon declined the colonelcy of his regiment, offered by those whose observation of him in the field led them to desire his leadership. He intended to resume his profession in civil life and simply could not suspend his familiarity with it, willing as he was to serve his country if necessary at the cost of his life. There is no reason to suppose that this instance stood alone.

I insist, then, with much confidence, not that medical officers and line officers are interchangeable factors in the organization of an army, but that, as is sometimes alleged, a "doctor" by the fact of his becoming a doctor has *not* had the qualities inherent in a natural soldier eliminated.

But it sometimes happens that those, military as well as civil, who have not had extended experience place the wrong inflection upon "non-combatant" and imply by voice if not by word that the Medical Department is always in a bomb-proof, and is only under fire in the same sense that the officer with the ammunition train is "where the bullets are the thickest." This question of personal peril would not be introduced did not the uninformed so frequently allude to it and in such a way as to make for the medical corps a service reputation as being not only unharmed but unthreatened. I know of none of much service in the face

of the enemy who indulge in any innuendoes upon the exposure or the courage of their medical comrades, but it is those speaking in the plenitude of their ignorance who create such erroneous impressions.

It is self-evident that there is no rear in an Indian fight, and that one scalp is as acceptable as another to a savage foe. Grasson fell at St. Clair's defeat, Gatlin perished with Dade as Lord with Custer, and within the past five years Maddox was killed in an Apache affair. Doubtless others of whom I am ignorant have died, and still others have been wounded. In the latest severe Indian campaign a young medical officer, happily unharmed, was complimented in orders for his conduct as a soldier. But beyond such exceptional conditions it is proper for our purposes to quote experience in civilized war. As far back as 1814 the chief medical officer made a report to the surgeon-general, from which these extracts are offered: "In events of high importance it is seldom the medical staff are noticed. This is discouraging to the ambitious young surgeon of the army. It may be alleged that the surgeons, being non-combatants, are out of danger. This, however, is not always the case. During the investment of Plattsburgh by the enemy, the surgeons were constantly passing from fort to fort or block-houses to dress the wounded, exposed to a cross-fire of round and grape-shot, while the greater part of the army were covered by fortifications. The cool bravery of the surgeons was, in private conversation, noticed by the commander-in-chief; had half as much been reported to the War Department respecting them, they would have felt themselves amply compensated." The writer then goes on to explain that he himself was in another and comparatively protected station, and that there is no personal commendation concealed within. In the same war Andrew Jackson, in a general order upon the battle on the plain of Chalmette, published to the army, says: "The medical staff has merited well of the country, and the General would not do justice to his own feelings, were he to withhold from Doctor Ker, hospital surgeon, who volunteered his services, and Doctor Flood, the just tribute of applause, deserved by them for their medical skill and personal bravery." After Monterey, General Worth officially thanks the medical officers, whom he mentions by name, "who were ever on hand in the close fight." Carleton, a participant in and the historian of Buena Vista, mentioning certain medical officers by name, says:

“The courageous manner in which these gentlemen passed along the line and rendered assistance to the wounded, oftentimes at the moment they fell; the positions of imminent peril to which they cheerfully and at all times hurried whenever their professional services were required at the instant * * * gained for them the unqualified praise of the whole army.” In a special report by General Wool as to the “important and gallant services” rendered by Assistant-Surgeon Prevost, whom he employed as an aide during the battle, after particularizing his achievements, he recommends him “to the special notice of the Secretary of War for his daring courage and gallant bearing on the fields of Buena Vista.” After Cherubusco General Worth reported: “The medical corps [mentioning the officers by name] presents claims to especial thanks and admiration—ever among the most fearless and indifferent to hazard during the conflict. * * *

” At Molino del Rey one medical officer was slightly and one mortally wounded, the latter, Assistant-Surgeon Roberts, having taken command of Company I, Fifth Infantry, during the action, its own officers having been disabled. As General Worth expressed it, “He assumed the duties of his fallen comrades and was desperately wounded.” The Medical Director of General Scott’s army also was wounded in action so as to be unable to take the field for several months. During the siege of Puebla, September 13–October 14, 1847, the commanding officer made large requisitions on the medical officers and the convalescents under them for purposes of defense, and they were nightly on guard, and he reports himself “greatly indebted” to them.

In the War for the Union the record was the same in kind but greater in degree, as the forces engaged were larger. At Antietam alone three medical officers were killed; White, the Medical Director of the Sixth Corps, Revere of the 20th, and Kendall of the 12th Mass. Vols. It would be impossible, even were it desirable, to give the details of hazard and exposure to fire throughout the War itself, and I content myself with quoting from Brown, the historian of the corps, this summary: “That they did not shirk the post of danger is most conclusively shown by the following record of the casualties of the Regular and Volunteer staff during the War. Thirty-two were killed in battle or by guerillas or partisans, and nine by accident. Eighty-three were wounded in action, of whom ten died. Four died in rebel prisons, seven of yellow fever, three of cholera and 271 of

other diseases, most of which were incidental to camp life or the results of exposure in the field, making a roll of honor embracing 409 names of those whom it is a common error to consider not exposed to the dangers and chances of war." When 115 officers are killed or wounded in action, much more than the casualty list of all the other staff departments combined, it is time for non-combatant to be replaced by some more apt epithet. Of course, this enormous number of hits implies a very large aggregate within the zone of fire, an aggregate that the greater extent of that zone in the next war will then much increase. The collapse of the Confederacy has deprived us of much official information regarding its medical officers, but there is no reason to suppose that they were less exposed than were their Federal rivals. And it is a pleasure to note this brilliant special compliment from Major-General J. E. B. Stuart, which might be coveted by any military man. In his report of the Gettysburg campaign he says, Surgeon Talcott Eliason, of his command, "though without a superior in his profession, would, from his conduct on the field, excel as a colonel of cavalry."* Even a "combatant" and a "soldier" could ask no more to establish his military character.

The record in war, which cannot be gainsaid, establishes as fair a military position, as far as commission and exposure can make it, as any branch of the staff can display. One would feel called upon to apologize for laying such stress on the exposure of military men, which should be accepted as a matter of course, did not "non-combatants" and "hospitals in the rear" play so conspicuous a rôle in the argument of those who are disposed to deny military functions to the medical staff. Necessarily a certain large proportion of the Medical Department cannot be on actual field of battle, which is to a far greater extent true of the Supply Departments at large, of many reserves and of numerous line officers who are engaged in organizing and equipping new levies.

Notwithstanding a public advocate of such doctrine is liable to be charged with unbecoming vanity and is apt to be misconstrued, attention is now invited to the propriety of using within the Army the military instead of the civil title of the medical officer. "Doctor" no longer carries the weight that derivation only from a learned profession once gave it. There are men in

* "Official Records," Series I., Vol. xxvii., Part II., p. 685.

the ranks who bear it as rightfully as the Surgeon-General himself. Derived from so many sources, frequently abused, bestowed by popular voice or formal authority upon charlatans, druggists, dentists, veterinarians and clergymen of various degrees, sometimes with no right, sometimes in sport and sometimes most worthily, by itself "Doctor" means nothing. I fancy no one but a very young man takes much pride in this title as a title. Love and respect for the profession of medicine are very different from infatuation with an appellation. The sadly abused doctorate may be abandoned by the higher ranks of the civil profession, toward which some agitation at present points, but the science and the art of healing will never fall into disrepute among those who love to analyze the practical problems of human vitality and to relieve its ills. As will be noted later, the medical officer has functions quite distinct from those that are clinical, of which some are concerned with his special profession, and some are based upon the commission itself. Therefore, regardless of the confusion in which the use of a common title is liable to involve all kinds of doctors, there is, in an organization so systematic as the Army, every reason by analogy why the doctors, to speak of them by their most conspicuous function, should be graded among themselves and in relation to their comrades of other faculties. No feeling of propriety is satisfied when a newly-appointed youth and a veteran on the verge of retirement are addressed in precisely the same style.

It is my contention that in military life the medical officer should be known by his military designation, through its various grades. I know that this is a hard saying at its first expression to the most of the line, and to many of the medical staff on whom the unaccustomed title will rest uneasily. The latter will repeat the *ad captandum* statement that the President himself can make no man a doctor: to which is the rejoinder that under the law the President can make no man a colonel in the Medical Department, excepting as he makes himself. Others will say that his commission reads surgeon, or assistant surgeon, let him be content. So are the supply officers commissioned quartermasters or assistant quartermasters and commissaries of subsistence; but a wholesome experience has settled that the captain, major, and so forth of the various departments are the suitable titles for their address. There is absolutely no distinc-

tion between the commission of a surgeon and that of a quartermaster, except in those very words ; but no Regular quartermaster since the first tent was pitched was ever addressed as such, nor should he be. The general response, without consideration, is that after all they are doctors and that it is absurd to suppose a doctor can be any better or have any more influence than his character and personal learning bestow. In the same spirit the impulsive and arbitrary war secretary, in 1862, replied to the Surgeon General's request that the medical directors of the two larger armies should have a temporary rank beyond that of major, held in common with vast numbers of their subordinates, "Refused unless it can be shown that the skill and efficiency of surgeons are increased by an increase of rank and pay." By a similar argument the chief quartermasters and subsistence officers would have lost the increased rank with which they were invested soon after the organization of the Army of the Potomac. I no more pretend that a physician becomes more skilful as a physician, or as between two, because of a title corresponding to a higher grade, than I would affirm that an income of \$3000 would make him wiser than would one of \$2000. Indeed, I am perfectly willing to admit that frequently the younger members of the medical corps are more expert in the immediate *technique* of the profession than some of the older men, but I do not admit that they are more valuable officers throughout. That the claim is legitimate, even though it may be considered injudicious, is shown by the practice of the Adjutant-General, whose formal communications and orders always bear the strictly military title—an example commended to others. The remonstrants must remember that much of military progress and most of military respect and authority rest upon military titles. In the military organization there is a common and wholesome respect for rank. A major may not have more intelligence than a captain, but as he has more authority he is listened to with more respect. The military auditor is insensibly impressed by the title, and when the individual capacity of the two men is not known, the field officer's opinion always carries more weight than the subaltern's. By so much the more does a military title give its bearer among military men a respect that is not yielded to a civilian. If, as I firmly believe, medical officers are a necessary and an important part of the military establishment, then they should have the same adventitious assistance that in every other department is

so sedulously cultivated as a support to place. It is true abstractly and in the civil world that the strength of the medical corps depends upon its relation with science. But within military lines respect is associated with rank and in compliance with that unconscious habit rank should be distinctly and constantly defined. Why there should be objection to this, either within or without the corps itself, I fail to understand. Medical officers certainly cannot desire to be classed as aliens by those among whom they must pass their lives. Military men surely have the intelligence and should have the judgment to recognize as comrades others than the actual combatants in the most limited sense. In furtherance of this aim the uniform was given and salutes granted long ago; rank was added as a distinct necessity growing out of the Mexican War; precedence on occasions of ceremony and on all mixed duty not involving command has long been acknowledged; and the title as a common, not an exceptional, practice deserves similar recognition. This if for no other reason than its teaching influence over the rank and file, who will unhesitatingly do what the captain directs when they might neglect, if not question, the injunction of the doctor.

The inherent affection and wholesome respect for rank are conspicuously observed in the captain, tenacious of his brevet as major or lieutenant-colonel, in the colonel of his as general, shorn of actual authority as it has become. There are also medical officers who have brevets, some won by gallant conduct on the field, some given for service as faithful and meritorious as that similarly rewarded in the line, but how rarely are they recognized in common speech. Like all brevets, these are now in abeyance, sounds and nothing more; but like all brevets they are liable at any time to be vitalized by the will of the President, when the commissions they represent would have no such limitations of rank or command as are supposed to hedge the commissions in the corps.

But the essence of the whole matter is to be found in the proper answer to the question whether medical officers, after all, have any military functions? Are they not, as formerly, merely attached civilians to whom uniforms have been given for identification and commissions to insure tenure of office; intelligent gentlemen with the ordinary manly attributes, who accept hard service by the example of those around them, and who hold their own under fire by the natural courage inherent in human nature?

Are they not simply doctors, carers for damaged bodies, a high grade of servitors for the convenience of the fighting line, the soldiers, but not themselves soldiers? The subaltern, occupied with keeping the files closed, with repeating to a platoon the captain's drill commands, with occasionally exercising a company by himself, with taking roll-calls and knowing little more of a medical officer's duties than that a private missing from the ranks is in hospital and after awhile reappears because the doctor has marked him for duty, and recognizing that the same doctor pays many professional visits to his own sick babies, would naturally take that view in time of peace. The commanding officer, of the type that fortunately grows less year by year, sees in the medical officer only a convenient special agent who has no original authority nor jurisdiction and can have none, even when released from immediate control, as would a major or captain of the line, and looks upon him with the subaltern's eyes. If they are right then these should be merely physicians with as clearly defined and limited duty as those attending hospitals and dispensaries in civil life. A line officer should command the hospital and be responsible for its management. The doctor should do what he could for the sick, and nothing else. At distant posts a sufficient number of these would have to live among the troops. Near towns they could be obtained for and be paid by the visit.

They are wrong. In garrison, on boards and courts, in all but the distinctive operations of the line, the medical staff does its full share of military duty; in war, for whose operations peace is the preparation, its rôle is vastly more important, and then it is practically more independent of all but the most general control than any other branch of the staff. It is as a clinician that the medical officer stands apart from and above the line and in the care of the disabled, by virtue of this special function, merits Cicero's eulogy, that "men in no way approach nearer the gods than in giving health to their fellow men." With a knowledge of military conditions and necessities engrafted upon this special education, he has an equally important potential power in the prevention of disease. And precisely as he understands the conditions of military life is he most efficient in that respect. Those who discourage medical officers from pursuing any study but that of medicine proper, stand in their own light.

It is not, however, by carrying out specific orders, carefully provided for him as one of the staff, that the medical officer's

duties are completed. In more than any other branch it is his province to originate work. This is not always clearly understood. While in common with every other officer of a garrison, the *execution* of work is limited to his own organization, it is especially required of him to make a frequent and comprehensive survey of his surroundings, to draw attention to the sanitary errors and, by implication, to point out methods for the improvement of what already may be good. With an intelligent commanding officer it is chiefly a question of tact how far these recommendations shall become effective; with one who is ignorant or narrow-minded, the medical officer's lot is peculiarly unpleasant in this respect. But in either case his duty is both important and clear, and by their insistence upon it the regulations relieve him entirely from the charge of intrusion. Nevertheless were it not specifically required, it would be his moral duty to report for the commanding officer's information what now is enjoined. This power of the initiative is very limited among the remaining staff.

But it is frequently insisted that they are merely advisors; that their functions begin and end with laying certain opinions before the commanding officer, with whom rests and from whom issues the determining action. Nothing is better settled or more reasonable in military life than that there can be but one commanding officer, and I know of no medical officer who attempts or desires to arrogate to himself those functions in a post or with an organized command. Nevertheless in his ordinary duty as a staff officer he has in practice important and substantially independent control. His daily duty of designating the sick and the well was outlined in the first regulations of the army, those of 1779, to wit: "When a soldier has been sick, he must not be put on duty till he has recovered sufficient strength, of which the surgeon should be the judge." In all matters pertaining to the sick, to those claiming to be sick, and sometimes to those who insist that they are well, the medical officer's authority is practically final, and it is so regarded in common speech. For instance, the commanding officer of a Regular regiment reporting his absence from important engagements on the Virginia Peninsula in 1862, says* he was on sick report "and was ordered by the assistant surgeon to the rear," and again, on another occasion, that he "was sent by the assistant

* "Official Records." Series I., Vol. XI., Part II., p. 363.

surgeon to the rear." So the commanding officer of a Regular brigade reports that his predecessor "had been ordered by the surgeon to the hospital at general headquarters."* These were not crude volunteers, misusing terms and misapprehending authority. They were educated soldiers, who recognized the authority and reported the facts. Again, it fell within my personal knowledge that between the fights on the Chickahominy a junior medical officer took the responsibility of determining that the commander of a Regular regiment was unable to discharge his duties, although attempting to do so, and made himself responsible for devolving the command upon the next in rank. So that although medical officers may be supposed to have no command, they have an authority that is equal to command.

I think the notion prevails that the management of a post hospital is a very simple matter from a military point of view—that any one can command sick men. Successful command implies obedience, and to reduce to one level as many men as are contained in an ordinary company of infantry, gathered from ten or more different organizations, in varying degrees of physical vigor, for whose health allowance must be made and who have no homogeneous model, is no trifle. Besides carrying out the scrupulous care necessary in the building itself and its appliances, and the preparation of the elaborate professional reports, the detachment of a dozen or more men, whose administration is identical with that of a company, must be so managed as to obtain the most effectual discharge of their arduous and often distasteful duties.

To sum up his position in peace. The medical officer is a staff officer of the post in that he represents the commanding officer for certain purposes, he necessarily exercises direct command over the hospital as just observed, he is a representative of the general staff in all his relations to the chief of his department in Washington and to the Army at large and, what is rarely recognized in terms, he differs from all other officers not in post command in that he is frequently compelled to inaugurate business, to originate duty.

But in war. With war spring up vast camps for the active, and for the disabled large hospitals, sometimes in the field of canvas, sometimes far within the lines and more permanent. The moment active hostilities begin the medical officer assumes a new

* *Op. cit.* p. 371.

rôle. The officers of the ambulance service, who are line officers, are controlled by the medical director. The medical officers of the field hospitals are responsible through the Medical Department to the highest, not the lower authorities. The wounded on being wounded, officers or men, pass beyond their regimental authority and are not only cared for but controlled by the Medical Department, subject of course to the orders of the commanding general. The same is true of the sick once passing the regimental lines.

The latest writer upon the Army, a well-known and competent authority, says,* "an efficient medical officer must be a good quartermaster and a good commissary" in addition to being professionally skilful. A complete definition goes further, and requires him to be a good commanding officer. Medical officers in charge of general hospitals "are invested with all the prerogatives of commanding officers and will be obeyed and respected accordingly," and they are not subject to the orders of local commanders other than those of geographical divisions or departments (A. R. 1611). This command covers all officers of whatever grade, whether under treatment or attached for military or administrative purposes. Medical officers have in this way commanded hospitals of many hundred patients, with all their attendants, their guards of the line, and detailed quartermasters and subsistence officers. The command of an organized post with its full complement of line officers as a part of its machinery is a bagatelle beside that of the shifting current of units from half a hundred regiments, coming and going, with wants of all kinds to be supplied in addition to their efficient treatment. During the Civil War many hospitals were equivalent to brigades in the numbers involved. The corps that furnishes officers for such work need have no doubt of its own capacity. The line officers who witness that work are not the ones who raise any question as to the military status of the Medical Department. The management of those war hospitals was such that by common consent they became models for the world.

But some limit the meaning of "military" to "tactical" or "strategical," and are disposed to throw without the pale all who do not manœuvre battalions in the field, or who are not at least theoretical experts of the Art of War. They profess inability to understand how this so-called "non-combatant" can be a military

* General Merritt, *Harper's Magazine*, March, 1890, p. 498.

official. To quote from a paper written many years since: "These mistake the objects of war. They forget that the army is the great conservator of peace. They look upon slaughter as the end instead of one of the means. Were devastation of life and property the aim, they might be right. If the army of the republic were a collection of barbarians, it is conceivable the view our amiable citizens have taken might be the correct one. But war is an agent. It is carried on to terrify the enemy. When persuasion fails force, acting through fear and constraint, is employed: Men are killed as a means, in no sense an end. Whatever increases the efficiency—that is, the resisting and operating power—of the great agent of war, the army, is valuable and should form an integral part of it: Its killing capacity is measured by the manner it receives as well as administers blows; and the guardians of its physical health are no mean promoters of its efficiency. In proportion to this value does the medical officer become literally incorporated into the army—flesh of its flesh."* "Loyalty to truth, honor and authority, the observance of discipline for its own sake as well as for its results, the possession of that moral and physical courage that will carry a man who is right through death in any shape, but never near dishonor, are the essentials of a soldier, and whether he leads men to battle by word of command or inspires them to valor by his coolness he is equally worthy."†

It seems to me that after all the barrier, if there be a barrier, is very low, the boundary but ill-defined between officers of the line and those of the medical staff in everything excepting the matter of direct command. The lives of medical officers are spent where the troops of the line spend theirs, they go out and come in with them, share their pleasures and their privations, and, as far as identity of public interest goes, are at one with them.

Very little may be said on an occasion like this as to the strictly professional work done by the medical corps. Selected by an impartial examination, the most stringent of its kind in this country, although doubtless mistakes both in admissions and rejections are made, the fulness of their knowledge makes them thoroughly conscious of their deficiencies, as well as sure of their ground when it is secure under them. With an assured position

* *U. S. Service Magazine*, I. No. 5 (May, 1864), p. 480.

† *Ibid.*, p. 481.

there is no temptation to use cases as capital, and as a rule the most meritorious men are the most reticent as to their work. It is hardly too much to say that case after case occurs in the seclusion of post hospitals, or in the isolation of garrison life, that in a civil community would lead to wide professional reputation and to wealth. There is not a post of any size where the medical officers have not constantly under consideration some serious problem involving health, if not life, that is only known to those not interested when art fails and death wins. This responsibility for life itself constantly overhangs the medical officer, who is not merely theoretically but literally always on duty. And it is a care that cannot be devolved upon another nor be lightened by general discussion. One condition that seriously detracts from his official prestige in a military community is the necessity for the medical officer's presence in the discharge of his duty. The panacea for other officers—to issue an order—will not compass the end; and in a society where the junior generally waits upon the senior, the obligation to reverse the procedure tends to diminish respect in unreflecting eyes. While the sometimes ill-considered requests, often delivered by discourteous servants or ill-mannered children in the form of commands, with that insistence of haste and aggravation of importance that such ignorant messengers frequently add, are trials that the most phlegmatic cannot always placidly endure. But these minor matters would have no value, did they not tend by their conspicuous and more common character to leave an impression upon military society greater than that made by the grave public duties discharged without publicity, and thus to bring the gratuitous family physician and general convenience theory more glaringly to the front.

As satisfactory in most respects as are the organization and interior management of the Medical Department, there remains possible progress whose discussion falls outside of such public lines as these. But there are three points for improvement that concern the Army at large where army public opinion could materially lend its aid. The first is the special instruction of the medical officer in his peculiar duties. There is little doubt that the newly-appointed medical officer will be found an intelligent physician and as little doubt that he finds himself in a society of whose special attributes he knows nothing. Unless he has the good fortune to serve with an experienced member of his own

corps who will take the trouble to carefully instruct him, and not merely make use of him to discharge distasteful and routine professional duties, he must acquire his technical knowledge by an experience that at first will lead him wrong quite as often as right. It frequently happens that he will be sent out alone with troops or, what is still more embarrassing, to the charge of a garrison. As a consequence it is a fact that, except within certain general lines, there are no absolutely uniform rules of conduct, and it is probable that in minor matters no two hospitals are conducted exactly alike. What is required is that every young appointee should be sent as a *supernumerary*, not for full responsibility, to a large post for instruction in matters outside of the profession of medicine. Or, which would be much more acceptable, that some large station should be set apart as a school of instruction in technical affairs, in the preparation of reports and papers, in the customs of the Service, written and unwritten, and in their personal carriage, including horsemanship. An outline of these matters in print is especially desirable for the sake of uniformity. In the British service after a candidate has passed his professional examination he is sent on probation to a school of that character conducted by medical officers, and he is not commissioned until he is further approved by them after fair instruction and trial in such duty.

The second point is the special disadvantage under which medical officers in service labor in their isolation. It is true of students as of society that "iron sharpeneth iron; so a man sharpeneth the countenance of his friend." Medicine is a progressive science, and those out of the current must be caught in the eddies and lose progress, or sometimes be stranded on the bars or entangled against the banks. The liberal supply of medical literature does not entirely replace observation and expert discussion. There should be provision, which could easily be arranged, for the compulsory attendance of the younger men, and the voluntary attendance of any one, at such a standard institution as, for instance, Johns Hopkins, for a post graduate course. Many medical officers do take such special courses as their time and means allow, but they do it at the sacrifice of their leaves and their official income, as well as by paying for the instruction obtained. This should be provided without expense to them, and they should prove their appreciation of its advantages by their reports and practical work. The infantry,

cavalry, artillery and engineers have their special schools. The medical corps deserves equal privileges, and the result would be to the advantage of the whole Service.

The third point is a practicable scheme for the elimination of the unworthy. The law provides that the grade of surgeon shall not be attained without a service of at least five years and an examination, and originally it was held that failure to pass the examination vacated the commission. But to protect the army at large from arbitrary dismissal, a general law now forbids any punitive loss of commission except by a court-martial. The consequence, unintentional but actual, is that there is no method by which an incompetent medical officer can be disposed of unless it may be by the action of a board that should wholly retire him, a procedure of doubtful expediency, and that certainly should not be employed as against medical officers, incompetents of the line being exempt. The only penalty now for failure to pass the examination is the loss of promotion. The deficient medical officer may remain an incubus forever, shorn only of his accession to the higher grade. To make matters worse, the present practice is to defer the examination to the latest possible period instead of, as has been the excellent custom, applying the test comparatively early in his career or about the time he acquires the rank of captain. As promotion in time of peace occurs between fifteen and twenty-five years, this delay is a decided drawback to the efficiency of the Department.

There is one other condition, supposed to be only temporary, but that has persisted for years, and affects the Army at large, but not as unfortunately as it does the Medical Department. That is the extreme difficulty found in retiring those physically disabled. This is less a question of promotion, as with the line, than of service. The numerous medical officers physically unable to discharge their appropriate duties represent so many vacancies, whose place for work must be filled by a corps already too weak for the demands of the Service. If an officer is permanently disabled his place must be filled. The line has numerous officers, who are substantially interchangeable, in each organization. The medical staff can only supply one vacancy by practically creating another. The remedy is well known and could easily be applied.

There is a matter of international concern, popularly regarded as a step toward the millennium, that in my judgment is wholly

unsuited in its present form to the United States Army, and whose influence upon the dignity of the medical corps is detrimental. This is the Geneva Convention, whose object is the neutrality of the sick and wounded, of the hospitals, and of the medical officers on the field. If this were limited to the time after the battle it would be less objectionable ; but to include, as I understand it does, the active operations, I believe is impracticable and would be disadvantageous if it could be carried out. It is unnecessary, for no civilized enemy will fire upon hospitals, knowing them to be such, if it can be avoided, unless under the moral certainty that they are used as aggressive bases ; nor will he interfere with the professional work of the medical corps. With an uncivilized enemy no such conventions can be executed. The only effect is conspicuously to brand a medical officer as substantially a military eunuch, to deprive him of active co-operation but not to lessen in any appreciable degree his peril in the field. The medical officers who are under artillery fire will not be protected by a white cloth with a red cross on their arms. Long range small arms have no respect for persons. The protection afforded is purely imaginary. But the restraining influence may be serious. It may be and often is the duty of a medical director and a medical inspector to ride freely over the field at the beginning of a battle. White, the medical director of the Sixth Corps, was with the general and his staff when shot at Antietam.* Suppose that he had been recognized as a medical officer, and therefore had not been fired upon ; but suppose, further, that from his proximity to the enemy he had discovered him, was he not to warn his general and his comrades ? Still that would have been a violation of neutrality, and more had he been able to compass the capture or destruction of the foe. If any man is so clothed as to be protected by international law decent reciprocity requires his actual neutrality. In that case his own army can have no advantage of his presence in any combatant sense. But, exceptionally, such service may be very important. The local knowledge of a medical officer made him a guide in a turning movement in Virginia. I have seen a broken line of battle restored, in part, by a medical officer ; prisoners have been taken by them, and aides' duties frequently and efficiently performed under fire. I think no medical officer of the United States wishes to clothe himself in a garb of immunity, that at best is like the Persian monarch's

* Brown, " The Medical Department of the Army," p. 228.

invisible robe of innocence, and to allow his fellows to fight it out as best they may without contributing his share, however unimportant, toward the victory. For myself, and I suspect I am not alone, I desire no place under the Geneva flag except as it points the way to a haven of succor.

It is to be inferred from this paper that, for one, I am dissatisfied with the nomenclature and with the presumed limitations of the Medical Department. Surgeons and assistant surgeons are pseudonyms, not descriptive titles. Even in war the sick vastly outnumber those who require surgical aid. An assistant surgeon rarely assists, excepting at the very inception of his career, and it is absurd to characterize by such a designation a man of forty years or more, long in independent charge. The medical officers are medical officers, neither more nor less, and should be so denominated. In my judgment, and it is no hasty opinion, but the result of many years' experience and reflection, the Department should be organized with a certain number of lieutenants, captains, majors, lieutenant-colonels, and colonels in the medical corps, as in the engineers and ordnance. Spasmodic efforts have been made to engraft upon the higher grades such titles as deputy surgeons-general and assistant surgeons-general, as in the Quartermaster's and Pay Departments. These are misnomers and out of place. However suitable for the supply departments, which I do not pretend to determine, these titles would add no dignity and define no function beyond those of Lieutenant-Colonel and Colonel, Medical Corps, distinctions that could only be acquired by service and be worn by merit and that have no such limitations as the one-sided and incomplete "surgeon" implies.

With a chief of the corps selected for his learning in science, experience in the field and tried administrative faculty, and its ranks do not lack such men, with officers standing on a well-defined legal platform of equality with the staff at large, and with its history of faithful and conspicuous service alongside the line wherever the line itself is found, the future of this branch of the Army will be even more auspicious than its past has been prosperous.*

* For discussion on this paper see "Comment and Criticism."

THE FIFTH CORPS AMBULANCE TRAIN, 1864.

By LIEUT.-COL. W. F. DRUM, U. S. A.,

TWELFTH INFANTRY.

HAVING been honored by a request from our enterprising Recorder, to read a paper before this Commandery,* the question naturally arose, what is there in my experience that would be interesting? I have finally ventured to write a brief account of the management and operations of the Fifth Corps Ambulance Train, during the Virginia Campaign in the spring and summer of 1864, and hope it will be acceptable.

It is comparatively a new field, but little having been written of the work done by the brave and faithful men who carried stretchers instead of rifles.

I was detailed Chief Ambulance Officer of the 5th Army Corps, Army of the Potomac, in February, 1864, and at once ordered to make a careful inspection of the train, report its condition and make necessary requisitions for supplies to put it in complete order for the coming campaign.

The 5th Corps at that time extended along the Orange and Alexandria Railroad, from Manassas Junction to Rappahannock Station, and the ambulance train was much scattered, a few ambulances and wagons being kept at each brigade headquarters. It was found that much labor and material were necessary to put the train in condition for field work.

In March, 1864, a law was passed for the organization of the Ambulance Corps, which law also fixes severe penalties for the improper use of ambulances. For the passage of this law, the Army was largely indebted to the efforts of that good friend of the soldier, the Hon. Henry Wilson, of Massachusetts.

About that time, General G. K. Warren succeeded General George Sykes (relieved on account of ill-health) in the command of the 5th Army Corps, and he was directed to concentrate his Corps in the vicinity of Culpepper Court House. The ambulance train was then assembled and the work on it pushed for-

* Read before Minn. Commandery, M. O. L. L., U. S.

ward with energy, the harness was overhauled, ambulances and wagons thoroughly repaired and repainted, and the necessary animals obtained, so that by the 1st of May the train was ready for the field, with extra parts lashed to each ambulance and wagon. It was also found necessary to make some changes in the personnel. All who were found to be inefficient were relieved and others detailed. In making these details effort was made to obtain men who possessed good soldierly qualities. In this matter I was greatly assisted by Colonel (now Brevet Brigadier-General) F. T. Locke, Adjutant-General of the 5th Army Corps.

On the 1st day of May, 1864, the 5th Corps Ambulance Corps and Train, as organized under the new law referred to, consisted of seventeen commissioned officers of the line, five hundred and fifty enlisted men, one hundred and seventy-one two-horse ambulances, sixty-two army wagons, for quartermaster and hospital supplies, eleven medicine wagons, five hundred and twenty-eight horses, and three hundred and forty-eight mules.

This strength was slightly increased before June 30th, by reason of new organizations joining the 5th Corps. Surgeon (now Brevet Brigadier-General) John J. Milhau, Medical Director of the Corps, was the head and had supervision over the Medical Department and Ambulance Corps. A captain of the line was detailed as commander of the corps, and styled Chief Ambulance Officer. A 1st lieutenant was detailed for each Division, who was also quartermaster and commissary for that portion of the train, and a 2d lieutenant was detailed in each brigade. One sergeant was detailed from each regiment and three privates for each ambulance to which the regiment was entitled (one driver, and two stretcher bearers). To each regiment of infantry of 500 men or more, three ambulances were allowed; for 200 and less than 500, two ambulances, and for less than 200, one ambulance. Two to each regiment of cavalry of 500 men or more, and one to each regiment of less than 500, and one to each battery of artillery.

The line officers referred to received strict orders to assist and co-operate with the officers of the Medical Corps. They were also instructed to assist all sick and wounded men who came within their reach, without reference to the corps, division or brigade to which they might belong. In case an ambulance broke down on the march it was pulled out of the road, and the

broken parts replaced in a few minutes, or if too badly injured to be so repaired, it was at once wrecked and all detachable parts were tied on the other ambulances for future use. By this course only four ambulances were lost in May and June, although many wheels and other parts were broken. On going into camp the trains were parked as near the division hospitals as practicable, and such details of ambulances as were needed reported to the surgeons in charge. The horses and mules were shod and all necessary repairing done as soon as possible. Every opportunity was taken advantage of to obtain the necessary supplies and animals, and, when practicable, weekly inspections were made of all pertaining to the camps and trains. Before an engagement, all stretcher bearers were ordered to their regiments; afterward, when the wounded had been taken from the field to the hospital, the bearers were sent back to assist in loading them in wagons, to be taken to the nearest depot or boat landing, and sent north. This work was generally done at night. As ambulances could not always be spared from the front, the wagons that brought rations to the Army were used in sending the wounded back to the depot. Each wagon was first nearly filled with small pine boughs, and then covered with blankets, forming a mattress, on which the wounded would ride with as little discomfort as in the ambulances with their stiff springs, which is not saying much, for there is no comfort for a wounded man in a wagon strong enough for field service and on rough roads, except in the feeling that he is being taken where he will be well cared for and made as comfortable as possible. It has been said, and I believe with truth, that it is a very brave man with a high sense of duty who willingly goes under fire without arms. When we remove from a man the power to strike back, we take away that element of pugnacity which is a great support in time of danger. The officers and men of the Ambulance Corps did all in their power to find the wounded and remove them to the hospitals, but it is not strange, however lamentable, that on a field as rough as that fought over by the Army of the Potomac in May, 1864, and with lines constantly changing position, that many of our brave men were never taken off, and that some of them were probably burned by the fires that started in the thickets.

The largest regiments were only allowed six men for that work, and as they could only carry off three badly wounded men at a

time, it will be seen that they would have to make many trips if the loss was heavy, from the line back to the nearest surgeon. Many wounded men were fortunately able to walk a short distance, and others were assisted by their comrades. One object of the Ambulance Law was to obviate the necessity of men leaving the ranks, and all unwounded men were sent back to their commands on reaching the ambulances. It was found not practicable to concentrate the stretcher-men, as were the ambulances, on that part of the line which suffered most.

When the 5th Corps was detached on the 18th of August, 1864, to operate on the Weldon Railroad, but limited hospital accommodations were taken, and the principal hospital was maintained nearer Petersburg. The enemy, on the afternoon of the 19th of August, penetrated some distance between the 5th Corps and the rest of the Army, and in making the necessary detour a train of wounded that night were obliged to pass through fields made very soft by the heavy rains, and unfortunately got into quicksand; the ambulances sank almost to the boxes, and the horses got down so that they had to be unharnessed and led out to solid ground. The men, leg deep in mud and water, pulled the ambulances out by hand. It was nearly morning when the train finally reached the road to the hospital. Nothing but a strong sense of duty and sympathy for the sufferers in the ambulances could have induced men to work as those men did that night. The wounded suffered from the delay, but it was unavoidable. On one occasion a stretcher man did good service in assisting to stop a stampede. Near Spottsylvania Court House a brigade was seized with one of those senseless and unaccountable panics which would sometimes occur, and while efforts were being made to stop the crowd as they came back, I noticed a large man near me holding a stretcher by one end and swinging it vigorously, stopping very effectually all he could hit. After the excitement was somewhat over he came up to me and whispered (for he had lost his voice in some way), "Captain, wouldn't I give it to them if I could only talk."

As an exhibition of good nerve, at the Weldon Railroad it was necessary to park the ambulance for a time, under fire, and although the shells came uncomfortably close, each driver kept his team in place and the line well dressed, until ordered to move out. Some of the drivers looked very white, but they stayed there.

In the fall of 1864, I was told by a medical officer of the 5th Corps that a larger percentage of the wounded had died in hospital than in campaigns earlier in the War. While at first glance that appears to detract from the reputation of the surgeons, it was really due to the fact that more desperately wounded men reached the hospital alive, and it follows that some were probably saved who in former campaigns would have died on the field. A few extracts from reports will show the work accomplished:

EXTRACTS FROM REPORTS OF CHIEF AMBULANCE OFFICER FOR
MAY AND JUNE, 1864.

* * * * *

In all the battles in which the 5th Army Corps has been engaged, the principle in the management of the train has been the same—that is, the ambulances have been sent where they were most needed, without reference to any particular Division; if any one of the Divisions, as was frequently the case, suffered much more than the others, the majority of the ambulances in the Corps were used in transporting the wounded of that Division to the hospital. At the beginning of a battle, the whole train of ambulances was generally parked at some central point, in charge of an officer. A few ambulances were then sent as near as possible to the line of battle of each Division; in that way but few were exposed to fire at one time, and the stretcher men had but a short distance to carry the wounded. As fast as the ambulances at the front were loaded and sent to the hospital the officer in charge of the main park would send others to take their places, in this way placing the whole train at the disposal of the Division most in need. In the disposition of the officers, one, as stated before, was placed in charge of the main park, one or two superintended the loading at each Division, and the remainder superintended the removal from the field to the ambulances. It was sometimes necessary to have an officer at the hospital to expedite the unloading and return the ambulances to the main park.

By managing the train in the manner explained it is believed that the wounded were removed more expeditiously than they could have been in any other way with the means at hand. During the campaign, the ambulance train of the 5th

Corps removed nearly eight thousand wounded men from the following fields to the hospitals, viz. :

The Wilderness,	-	-	-	-	1800
Laurel Hill,	-	-	-	-	3000
Spottsylvania,	-	-	-	-	300
North Anna,	-	-	-	-	180
Brockinbrough's House,	-	-	-	-	525
Bethesda Church,	-	-	-	-	680
In front of Petersburg,	-	-	-	-	1500

7985

The train also assisted in transporting the same number of wounded, and over one thousand sick from the hospitals to be sent North.

* * * * *

While in the performance of their duties six stretcher bearers were killed; one officer, four sergeants and seventeen stretcher bearers were wounded. Three sergeants and nine stretcher bearers were taken prisoners. Total casualties in Ambulance Corps for May and June, 39.

* * * * *

The train started with ten days' grain for each animal, afterwards grain was drawn, whenever we were within reach of a depot, and care taken to obtain forage from the country, by this means ambulance officers managed to keep grain on hand, but were not able at all times to feed the full rations. Owing to the severe work the animals became much reduced in flesh and many were entirely broken down. Eight horses were killed or wounded in action; 34 horses and 26 mules died; 2 horses were stolen; 3 horses were captured; 39 horses and 16 mules were broken down and turned into depot.

* * * * *

There were 872 ambulance and 766 army wagon loads of wounded sent to depot from the corps hospitals.

* * * * *

I have no memorandum by which I can show the number of sick and wounded taken from the intrenchments in front of Petersburg to the hospital and thence to City Point for shipment North, between July 1st and August 18, 1864, but the number must have been considerable, for I doubt if a day passed without casualties on that part of the line.

EXTRACTS FROM REPORT OF CHIEF AMBULANCE OFFICERS, 5TH
ARMY CORPS, FOR THE 18TH, 19 AND 21ST OF AUGUST, 1864.

* * * * *

During the three days' fighting, the ambulances conveyed from the field of battle to the hospitals of the Corps, seven hundred and seventy-three of our own wounded; thirty of the 9th Corps, and one hundred and fifty-three of the enemy; besides about three hundred sick.

* * * * *

Great credit is due the officers and men for the untiring energy with which they worked day and night, in the rain and mud, in order to transport the wounded back to the hospitals as quickly as possible.

* * * * *

Two sergeants were killed; one sergeant and five stretcher men wounded; and nineteen stretcher men taken prisoners,—the total number of casualties for the three days, in the ambulance corps, twenty-seven.

Eight horses were killed and some of the ambulances were damaged by shells.

* * * * *

Being a daily witness of the work of the surgeons, which was intimately connected with the Ambulance Corps, it is proper I should say a word in regard to them.

During the terrible campaign, referred to in this paper, it would be difficult for a person not then present, to form a correct estimate of the great amount of professional work rendered by this very deserving class of officers. They frequently performed their duty under circumstances of great personal danger, and during and after an engagement they worked with but little rest, day and night, to save life and relieve from pain the gallant men who came under their care during that prolonged struggle.

Reprints and Translations.

STRATEGY AND MILITARY LEADERSHIP.*

BY MAJOR KEIM, GENERAL STAFF.

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Translated by JOHN P. WISSER, 1st Lieutenant 1st Artillery.

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IF it were possible to permit one of the most illustrious leaders of the beginning of this century, Duke Ferdinand of Brunswick, to inspect the German plan of operations for the War of 1870, the Duke would find little satisfaction in a plan of campaign, according to the views of his time, so thoroughly unscientific and inadequate. He will probably conceive a very unfavorable opinion of the Prussian General Staff, because there is no mention whatever in this plan of strategical points of support or key points, of strategical feints or strategical reserves, of positions or fortifications or magazines, of demonstrations or castleings or other learned things, but in their stead we hear in very plain words of the enemy, of a decisive battle to be contested with all available means. And if it were possible to have the greatest Prussian tactician of that time, General Von Saldern, as a spectator at the field exercises in battle tactics of a Prussian brigade he would no doubt sadly shake his head over this deterioration, this decay of tactics, over this complete lack of the finer comprehension of true tactical art, which certainly, according to the prevailing ideas, consisted principally in permitting the genius for drill to shine in complex forms, in the attack *en échelons*, in the advance *en échiquier*, in the ingenious withdrawal of the separate lines of battle in the retreat.

We again, on the contrary, throw aside entirely to-day these precepts and views on strategy and tactics, convinced that they are entirely false, appearing to us opposed to the very nature of war—with no certainty, to be sure, as to how our method of teaching the Art of War and the military leaders of our time will be judged at the end of the next century. We naturally hope that this judgment will be favorable. I have selected the following pictures to show what great changes our ideas in regard to war, in regard to the battle even, are subject to in the course of a comparatively short space of time. Our comrade in the army sums up this matter—after a little experience and in an unkind spirit of criticism—in the characteristic words:

“The Art of War is changeable,” and if we give this brother officer Berenhorst’s work, “Thoughts on the Art of War,” to read, in which book

* A lecture delivered to the Military Association of Berlin on the 12th of December, 1888.

the author attempts in an ingenious way to show that in war everything is determined by accident, he will be inclined to have a very poor opinion of the Art of War. If, in addition, he become convinced that a talent for war is in-born and cannot be learned, that practice is, moreover, the only practicable method, theory, on the other hand, a myth, he will be strengthened in his view that it is not worth the trouble to occupy himself more thoroughly with learning the Art of War. And yet this is a most deceptive, unwarranted and hazardous conclusion. War one cannot learn, nor can it be taught in the abstract, and in a certain sense the Art of War is indeed changeable, but changeable are mainly the mechanical, material parts, *i. e.*, the means for carrying on war are changeable. On the other hand, forever unchangeable remain the elements of time and space, quite unchangeable, at least as a whole, remains the earth's surface on which we carry on war, and finally forever unaltered remains the principal element in war, man with his faults and virtues, with his feelings and inclinations, with his brave or timorous heart.

These unalterable factors permit of the founding of a *Science of War* based on military history, the study of which, the ingenious application of which, form and will ever form the ground-work of the *Art of War*.

A mass of interesting relations, mutual reactions between strategy and the Art of War, may be developed. But I will avoid all abstract discussion, partly because to the soldier, even to the German soldier—in spite of the fact that he belongs to a people to whom the philosophic tendency of thought specially pertains—abstraction is not sympathetic, I will endeavor to connect my views directly with the active, the living, *i. e.*, I will select military history and its lessons as the connecting link between strategy and the Art of War—military history, which is and ever will be, in all that relates to war, an incorruptible and indispensable advisor.

It is very remarkable that the leadership of Frederick the Great exercised such a slight influence on the Science of War in his day. This phenomenon would be explained in the simplest way by adopting the view that the leadership of the great king was not an outgrowth of the teaching, the conception of war of that time. This view was maintained indeed by those who represented Frederick the Great as a *virtuoso*, not as a leader highly gifted, with a characteristic comprehension of war. This misconception of the qualities of the great king as a leader will be at once recognized as such if we hold to the actions of the king, to the entire art and method in which he acted in war, and not to particular expressions of his, or to separate campaigns, which at the beginning of his military career he voluntarily conducted in the spirit of the methodical mode of troop-leading, or which later on he was compelled to conduct in this spirit by the force of circumstances. That this estimation of him is false is proven, however, most strikingly by the fact that the most note-worthy representatives of the instruction in the Science of War of that day, the true *virtuosos* of the methodical system of conducting war, such as Prince Henry and his followers, were the very ones who passed unfavorable judgment on the king's leadership. They were therefore convinced that the generalship of the royal leader did not correspond to that system of strategy in which they saw embodied the sum of all strategi-

cal wisdom. They looked upon the king as a kind of lucky empiric, but not as initiated into the true, *i. e.*, the learned, pedantic, scientific mode of troop-leading as it was known and taught in those days.

Indeed, in this way only can we explain the fact that the true spirit of his generalship was not grasped by those who took part in the campaigns of Frederick the Great, but that long years passed by before the Art of War of the royal leader found complete vindication. But foremost of all was it the *practical* men who did not know what to do with the *spirit* of Frederick the Great's leadership and held all the more tenaciously, therefore, to the *forms* thereof—even after these *forms* had grown old and useless. They talked continually of Frederick the Great, but they did not think, teach or act in his spirit.

Although arguments may be advanced in explanation and excuse of the fact that the Science of War of that time considered so little of the leadership of Frederick worth learning, and assertions made to the effect that these methodical methods of troop-leading had always been good enough, yet these arguments fall when we remember that in the wars of the French Republic successes, I mean ultimate military successes of the allies, who had proceeded according to the teachings of the methodical method of troop-leading, were so completely and conspicuously wanting.

Men were so entirely convinced of the truth and infallibility of these teachings and of the scientific correctness of this method of troop-leading, that, in spite of all the military experience to the contrary, they could acquire no other view. The cause of the disasters was sought for principally in extraneous mechanical things. In the numerical superiority of the French, in the system of skirmishing and of requisition, in the good luck of particular leaders, in the difficulties of commanding the allied troops. Strange to say, however, the mechanical advantages of the French in these respects were not imitated—they kept up the linear tactics and the mode of supply by magazines, the poor arms and the defective system of recruitment, at least in Prussia—but in addition, they preserved the old theory of the Art of War, now for the first time coming to grief in the reality of war. The latter was regarded as a *noli me tangere*.

And yet it would have been so easy to find explanation of the French superiority and the causes of our own disasters, had we not become so deeply prejudiced, so utterly incapable of being taught. The causes consisted mainly in that little by little new elements had arisen in the Art of War, in that these new elements rested mainly on an intellectual basis, partly on a moral only; for the Prussian and Austrian armies were superior to the French army in respect to the training and formal instruction of the men. This is perfectly evident from all that is known of the inner relations of the French army. This intellectual superiority, however, rests mainly on the fact that the intelligence, the knowledge of the French army had been emancipated, that the rigid one-sided Science of War, the method of routine, was departed from, and in its stead larger views, corresponding to the new relations, were allowed to appear and to take their place. French strategy began to be imbued with the true spirit of war, it did not inquire after the kind of system nor after its origin, but set up for itself a high

ideal, with high aims, which it endeavored to attain by energy, by restless perseverance, by rapid and intelligent utilization of time and space.

In the first campaign the strategical knowledge of the allies lasted them up to Valmy—up to that point the military means on hand had been properly set in motion. But when it became necessary to correctly utilize these means, *i. e.*, to bring about a decisive action, the art of strategy was not equal to the task because its teachings declared the avoidance of a tactically decisive action as relatively the best course to be pursued. The leadership at Valmy had lost self-confidence—the worst thing that can happen in war—because it was left in the lurch by the teachings of the Science of War.

In the succeeding campaigns the plans of operation of the allies became more and more complex, more and more learned, more and more comprehensive; those of the French, on the contrary, continually simpler and clearer. The military plan of Mack for the campaign of 1794 in the Netherlands, regarded in his time as a masterpiece, may be taken as an example of the startling military theory of that day, supposing him opposed to an enterprising enemy; it corresponds almost to the art and method in which the wars of the Spanish succession were conducted.

While with the allies everything was carefully prescribed, ordered, paragraphed; the higher French authorities adopted more and more the principle of giving only general directions, of requiring self-reliance in the generals, and keeping in view the whole rather than going too much into detail. The adversaries of the French carried on war more bureaucratically—systematically. They had no independence of spirit, and this lack of self-reliance was characteristic not only of the higher leaders, but was to be found in all grades of the military hierarchy, and even had the higher commanders of the army imitated the system of the French and required more independence, it probably would have been without effect. This self-reliance cannot be ordered on the spur of the moment, it must be inculcated in time of peace, it cannot be learned mechanically, but must be spiritually acquired! This training, however, they lacked, because it was not in sympathy with the methodical, mechanical character of the Science of War and battle tactics.

Frederick the Great often complained—occasionally in very energetic terms—of the intellectual heaviness of his generals, of their lack of self-reliance; he complained because he had to order and arrange everything himself, that he had really but few generals. We will not go deeper into this subject and determine in how far Frederick is himself to blame for this state of affairs, but must hold the entire system responsible therefor, and, even if it must be acceded that after the glorious results of the Seven Years' War, no attempt was made to alter this system before 1792, the experiences of the French wars of Revolution must still, of necessity, have led to reflection, criticism and comparison. That this took place only in very narrow circles and in no way led to change a false system, to shake a harmful method of instruction, is a proof of the often pernicious power of habit, of tradition, of routine.

But there were also elements of an ethical nature which were to the advantage of the leadership of the French. Love of country, patriotism,

even political fanaticism, were the moving springs for extraordinary efforts and actions, while on the adversaries' side it was considered contrary to prescribed form, even unmilitary, to think of calculating with such factors. It was commonly believed that this could, to a great extent, be replaced by the drill-stick. Even the composition of the armies left little play for either moral or ethical influences; moreover, such violently active elements did not at all fit into the war system in use. The latter required a pedantic, easy and comfortable leadership, disinclined to anything out of the ordinary course; whereas an army, in which, through the system of universal military service, the impulse for decisive blows would naturally make itself felt, would have rendered such a war system useless.

The element, however, which contributed most effectively to the success of the French arms, was the energy in the leadership, the offensive, which was set up as the highest principle. Both the energy of leadership and the offensive had, however, become for the Science of War of the time, and therefore also for the leadership, empty conceptions. Soor, Hohenfriedberg, Rossbach and Leuthen had been long ago forgotten, quite as completely as if these battles had been fought many hundred years ago. But not only had the essence of the offensive been forgotten, but men had also forgotten to take hold energetically in war, without hesitation and regardless of consequences to themselves or others. Men had forgotten that Frederick the Great did not spare his own brother, that he gave Prince Leopold of Dessau a dressing down, and called his attention to the fact that he would have to answer for the result with his head. The French government, as is well known, had many generals, who did not know how to be victorious, guillotined. And although this mode of procedure may not be approved of, it was nevertheless the expression of an unalterable determination to be victorious under all circumstances. But when such a determination, whether emanating from the higher authorities or from the masses—that is a matter of indifference—makes itself felt, the energy of the leadership is secured.

How entirely different is all this on the side of the allies. A certain aristocratic silence, a proud contempt for these young and inexperienced—much stress was laid upon this point—*sans-culotte* generals gives the coloring here. And what indulgence for their own errors and mishaps. Every defeat which they experienced was palliated, every success exaggerated. They consoled themselves in the authoritative circles by saying that the French, seen in their true light, were victorious in a very unscientific way, contrary to all the laws of the Art of War. Meanwhile they lost one campaign after another, one province of German land after another, so that they were soon limited to the right bank of the Rhine. Of course, the successes of Clerfayt, of the Archduke Charles, are bright pages in the history of that time, and several of the larger combats brought at least honor to the Prussian arms—but the leadership as a whole was not touched thereby, otherwise there could have been no campaigns of 1805 and 1806, otherwise the Duke of Brunswick would not have been regarded in Germany at the end of the century as the greatest of all living generals.

Even the appearance of Napoleon and his great successes were not suf-

ficient to make apparent to the authoritative circles of Germany the superannuated, the defective, in the Science of War of that day. In Austria, perhaps even more than in Prussia, was this surprising, because there they found out by personal experience whither the holding on to the principles of an antiquated war system led. Even the theoretical men of that time, the speedy flight of which should have stirred up their spirits to activity, they had indeed some dark foreboding of the insufficiency of their military teachings, but when required to make the new phases in the Art of War useful to the Science of War and available in its instruction they were lost. Berenhorst tore down without building up anything useful. Bülow applied a comparatively great critical ability to no useful purpose in developing in his main work "the spirit of the modern system of war," a mathematically abstract science, teaching the excellence of eccentric lines of retreat, to be suddenly changed to concentric lines of attack, a system of which only the *termini technici* have formed practical application, and have indeed passed into military usage. A Science of War, in any way practicable, that long period of great battles did not mature. On the whole we stood at the end as at the beginning, scientifically at the tail end in strategy and tactics. Jomini alone, in his outline of strategy, which, founded as it was on the campaigns of Frederick the Great and the leadership of Napoleon, presented a new system of instruction, constituted an exception to the general rule.

As to this leadership of Napoleon's it must be admitted without reserve not only that it constitutes a decisive turning point in the art of conducting war, but also that it gave the impulse to and furnished the ground-work for the modern Science of War. Granting this, I would nevertheless like to call attention to various phases which may perhaps serve to limit somewhat the commonly received opinion, founded on his personal genius alone, of the wonderful generalship of Napoleon. In the first place we must remember that the material foundations for Napoleon's successes—as such we regard an improved tactics, an appropriate organization of the army and a perfected system of requisition—that all these things had been introduced into the French army many years before, and that the credit of this introduction belongs not to Napoleon, but to the "organizer of victory," Carnot.

Moreover, even the strategical and tactical principles of Napoleon, which we are accustomed to regard as the basis of his leadership, did not spring directly and perfect from his brain,—as Pallas Athene from the head of Zeus—as his enthusiastic admirers would have us believe. The Science of War as well as the Art of War develops historically—without any violent bounds, and particularly in the great commanders are the effects of earnest scientific study and intelligent application most evident. It was not Napoleon who first attempted to carry out practically the idea of concentrating strategically superior forces on the decisive points—this principle Carnot had already attempted to carry into effect—nor was it Napoleon who first carried out the idea of bringing about the tactical decision in a battle by an attack massed on a particular point of the line of battle—centre or wing. That Hannibal and Cæsar had done, and in a masterly way Frederick the Great in those measures of his which have since been designated the oblique order

of battle. This "concentration of masses" of Napoleon, as well in a strategical as in a tactical sense, has been stamped a philosopher's stone in the Science of War, an *arcanum* of victory. But by so doing men have rendered poor service to the military genius of Napoleon, and erred even as did they who thought they must discover in every battle of Frederick the Great a form of the oblique order of battle, or they who see the foundation of the German victories of 1866 and 1870 in the "divided" strategic advance and the system of operating on exterior lines. Such views are not very complimentary to commanders because they attribute to them a kind of narrow-mindedness, a power to act only according to definitely prescribed methods. Moreover, poor service is hereby rendered to the Science of War and poorer still to the Art of War, because in this way we most certainly adopt strategical and tactical models which do not conform to the true spirit of war.

Napoleon's merit consists mainly in that he broke away more fundamentally than had been done in the campaigns of 1792 to 1796, either on the part of the French or on the part of the Austrians, from the antiquated theories of troop-leading. His merit consists in that he made the *offensive* his rule of conduct and thereby restored the *spiritual as well as moral elements to predominance in leadership*; these had been forced into the background by the mechanical character which the Science of War had assumed. But his qualities shine most brilliantly perhaps in his measures to reap the rewards of victory, in his strategical pursuit, which, however, also find counterparts in military history, in Cromwell, for instance.

Moreover, it must not be forgotten that Napoleon, like Prince Eugene, like Frederick the Great, like Archduke Charles, and like all other prominent generals of recent times, was extremely diligent, eager after knowledge, and interested in all scientific studies. It is well known how, according to his own account, he studied, worked in the camp as in the cabinet, in order to add to his store of theoretical knowledge. It is well known what a high value he placed on the zealous study of military history, although himself a typical practical man. Providence does not throw successes into the lap of any mortal man; they can only be won by struggling, battling, striving and working, and the most prominent military men are just the ones who have almost without exception acquired the intellectual foundations for their deeds in war in the quiet of the study. Again—referring particularly to Napoleon's campaign of 1796 in Italy—it has lately been shown that the leading thought of this campaign did not proceed directly out of Napoleon's brain, but that an historical basis, derived from campaigns which had been enacted under similar relations on the same ground as that of 1796—that this basis, founded on general knowledge, exercised a decided effect on the end and aim of Napoleon's mode of action.

With this preponderance of intellectual training, founded on scientific study, of Napoleon—who is *par excellence* the representative of learned military leaders—accords also the fact that, with one or two exceptions, he did not found among his generals any special school, that these generals were useful only when they received orders and instructions from him personally. He had the same trouble with his generals that Frederick the Great experienced. These generals had become great only in routine work; they were neither,

scientifically nor intellectually, sufficiently well instructed to be able to act independently and confidently beyond a limited range. The necessary qualities of character, for this the generals of Napoleon as well as those of Frederick the Great, possessed in sufficient measure—they were brave men, experienced in war and with great decision of character—but character alone cannot accomplish the desired result; that alone is not sufficient without the assistance of clearness of mind and quickness and accuracy of thought, to enable men in critical moments to hit upon the *correct and proper* in war.

But while Napoleon was uninterruptedly directing his efforts towards giving expression, even in time of peace, in the organization and training of the army, to the teachings of war recognized by him as correct, *i. e.*, the instruction of the army tactically, we find in Germany the wretched picture of a self-satisfied mode of instruction in the Art of War, a holding fast to antiquated theories. One gets the impression that the important events transpiring and wars that were shaking empires had been entirely overlooked by the military world. But such could certainly not have been the case, for the renown of the French arms and the victories of Napoleon were undeniable facts. They, however, who were in a position to raise their voices and demand a change from the methods thus far followed of a system of warfare no longer adequate and quite antiquated; they who should have introduced another mode of instruction of the troops preparatory for battle—these remained silent, and expressed their conviction of the excellence of their Art of War. They desired neither to learn nor to forget. As pride goes before a fall, not only in case of individuals but also with peoples and armies, so they began already, by the power of tradition alone, to believe themselves a match for this “Bonaparte,” as he was commonly called.

While this “Bonaparte” was entering upon one of his most brilliant campaigns, that of 1805, and bringing the full force of the lightning power of his leadership to bear with annihilating effect, men in Berlin were talking and writing about the powerful effect of strategical manœuvre, discussing among other things the effect of a Prussian army in Thuringen on the French operating on the Danube. While Napoleon in the camp of Boulogne was unremittingly and systematically *preparing* his troops *for war*, *for fighting*, in Germany they were drilling with the square and astrolabe, practising things that in peace could be dispensed with and in war could not be used. While Napoleon in the battle of Austerlitz was fighting one of his finest battles by the power of the shock of columns, they were practising in Germany on the drill-ground the most complex attacks in long thin lines, and considered it the sublimest height of tactics to outflank the enemy *en échelons*, and to fight with comparatively shallow lines.

Strategy as well as battle tactics had become a parody. They believed, without considering the complete change of conditions and means, that they might live on the mere shadow of the art of troop-leading, because this shadow had been formerly redeemed by victories. Strategy as well as tactics had lost touch with the living factors of the art of leadership, with the experiences and teachings of war itself. They were forever talking about practice, but what they meant thereby was, when properly viewed

practice on the drill-ground—living practice, war and its lessons, was held by these practical men as of little worth. The new form of strategy did not fit into the prevailing system—it would have been very uncomfortable to get accustomed to new modes of thought, to become familiar with new forms. Exceptional men there were, to be sure, who were of the opinion that we should nevertheless advance and improve and adopt the good methods of the French victors. But such men were looked upon as “revolutionists,” who had no conception of the true war system.

With the strategy itself, with the official views on strategy and tactics, even men like Scharnhorst hardly dared at that time to meddle, so biased were even enlightened souls in regard to that which had been taught them as the Science of War.

In this Science of War—and herein lies one of the main explanations of the astonishing fact that men undoubtedly highly gifted held so tenaciously to the methodical and mechanical view of war—the higher military geography played an important part. So did fortification, considered in its relations to strategy.

Military geography is undoubtedly a most important and useful science, but it can easily lead to error if its possible effect on strategy be exaggerated—just as topography is unfavorable in its action when tactics pays too much attention to it.

Had the teachings of military geography always prevailed, military history would not have the crossings of the Alps by Hannibal, Suwarrow and Napoleon, nor the campaign of the Russians in China, to recount. But men clung with outspoken affection to this military geography, because, hallowed by custom, it constituted the principal part of higher strategy, even as the proper use of the ground for fortifications constitutes the principal part of lower strategy. These were the times of impregnable positions, these were the times when the conceptions of strategical curtains and strategical flanks created disorder and havoc. These views disappear from the Art of War after the year 1806, but very gradually; in the plans of operation military geography, to satisfy a weakness for positions and so-called strategical points (I need only call attention to the part played by the plateau of Langres in the campaign of 1814), helped more than was to be desired, even up to recent times often, to draw the eyes of the commander-in-chief away from the main point, that is, from the enemy. The bitter satire with which the founder of modern ballistics, William v. Ploennies in, his charming book: “*Life of General Leberecht vom Knopfe*,” treats this geographical strategy, in causing all the strategical lines of the continent to meet on the drill-ground of Winkelram, and making them thereby command all conceivable lines of operation, has a background of earnest reality in the scientific excrescences of a mechanical strategy.

As the Prussian army entered on the War of 1806, its views were still based on those of the methodical mode of conducting war, even as regards the battle. In consequence of a headstrong persistence in holding on to a theory which had become useless, it was not equal to the task which the practice of war had set it. The Prussian army with such schooling, which placed the platoon leader as well as the commander-in-chief in a false posi-

tion, could not win victory from a Napoleon. The immediate causes, the influences of a political, personal or mechanical character, Clausewitz has pointed out in so masterly and convincing a manner in his work, "An Account of Prussia in her Humiliation," just issued by the General Staff, that I will not tarry over that unfortunate time. On the battle-fields of Jena and Auerstädt a system of strategy and an art of war fell to pieces once for all, which had already failed fourteen years before at Valmy. This mode of troop-leading could not score any successes, because the foundation therefor, the strategy, had become incompetent. They had given mere *forms* precedence over their true *spirit*, and so no half reforms, no mere patch-work could be of any avail, because the far-seeing glance, the large-minded views of things—as Clausewitz puts it—would have been killed by red-tape and drill-ground wisdom.

There is one other phenomenon of that time, specially characteristic, to which I would like to call attention—I refer to the effect which a fantastic, or, as Clausewitz calls it, a brainsick conception of troop-leading, had in the campaign of 1806 as well as in that of 1805.

I need only mention the names of Mack and Massenbach as the personification of that system of troop-leading. But it must also be remembered that neither of them was simply a theoretical soldier, who had gathered his military experience at the office desk. Mack had served from the ranks up, took part in the campaigns of the Revolution, holding prominent positions, and Massenbach had won in the campaigns on the Rhine the reputation of a useful officer of the General Staff. Indeed, the latter did the army much permanent service—for example, the organization of the great Prussian General Staff, as it stands preserved in great measure to the present day, was due to Massenbach.

The causes of those fantastic mistakes are to be found primarily in the lack of spiritual self-discipline. Mack as well as Massenbach despised the truth, they lacked the desire, the sense of duty I may call it, to see things as they actually are. They despised theory, as well as practice, and each endeavored to set up in their place his own system.

This personal system, which finally reached such a point that it held that all sound principles could be confidently left out of consideration when working with certain small and paltry means, this system was presented and defended by those men with such confidence and regarded as so nearly infallible, that they knew how to meet every objection and how to obtain a considerable influence over the conclusions of military leaders. Both possessed considerable positive scientific knowledge, indeed, Massenbach had been instructed by Frederick the Great in person, and Mack was practically and theoretically in possession of the science of the general staff of that day—and because of this positive knowledge they impressed the great mass of those who had themselves learned very little. Thus, a general intellectual counterpoise, a thing which the stupidity of those men would have rendered impossible, was wanting, as was also that general training which would enable men to recognize from the beginning their inferior understanding and so render them harmless. For this reason did Archduke Charles have to stand out of the way of the influence of Mack, and so the war-tried soldier,

Prince Hohenlohe, lay under the dark power of Massenbach, for there was no sound, generally intelligible strategy which would have at once recognized these sickly excrescences as such. The re-establishment of the Prussian army, of the Prussian state, the renewal of the Prussian spirit, was due to men who before 1806 did not stand particularly high either from a military or political point of view. In that time, however, the traditional glance of the Hohenzollerns which put the right men in the right places, had been proven in a brilliant manner. While, in the political field, the "Jacobin" Freiherr v. Stein began to create a new Prussia, Scharnhorst, regarded slightly by the practical soldiers as "ideologist" and "learned in books," was the soul of all the endeavors to create a new army.

The *Sciences*, learning and studying in general, which up to that time had been considered necessary only for artillerists and engineers, began now to be honored. The Prussian examinations of officers, which required of the officers theoretical as well as practical knowledge, became the starting-point for a new system, which made knowledge the foundation for understanding. Since that time it has been the pride of the Prussian Corps of officers, regarded at the same time as its duty, to be the best instructed corps of officers in Europe.

This system has also matured principles of strategy which will probably remain authoritative for all time, and in connection therewith an Art of War arose to which are mainly due the successes of 1864, 1866 and 1870.

In the wars of deliverance this new system, if we lay the greatest weight on spiritual and moral factors and not on mechanical and technical things, took a decisive part in the victories obtained, and Field Marshal Blücher more than once said that all his energetic *willing* would never have materialized to *an act*, had not at the same time in the first gleam of light shed on the dark days of 1806, in the expedition against Lübeck, the intelligence of Scharnhorst, and in the years from 1813 to 1815 the active and powerful spirit of Gneisenau given to this willing an aim and purpose.

But the effect of a strategy, which now travelled in the right road, soon made itself felt. The idea that the offensive, *i. e.*, that action is the essential condition of military success had finally effected the downfall of the theory of a learned, weakly, systematic mode of troop-leading. The battle of Aspern had for the first time allowed this theory to pass into a victorious deed of armies other than French.

But that to all bold daring there must be a certain limitation was shown by Napoleon's campaign in Russia, which also taught the fact that in war as well as in other things man's aims must not reach out into the unnatural. Napoleon met with disaster in Russia, not through the skill of his enemies, not alone through adverse circumstances, but because he believed he could force victory by means of an overpowering mass of war material, by means of a gigantic plan of campaign, because in weighing and considering the matter he took as his guiding star only his own vaulting ambition, and overlooked the fact that human strength and human will is limited quite as effectually as human knowledge.

The battles with Napoleon which follow are of worth to strategy because they show, for one thing, what great difficulties the allied leadership brings

with it—again they are of worth because they show that energetic and tenacious holding fast to what is once recognized as correct, even when at first accompanied by defeats, may finally lead to success. Above all they teach and prove that the secret of victory lies principally in being able to lay down the law to the adversary. How this result is to be reached strategy cannot determine—she can only indicate it by pointing to the decided advantages of the offensive. Military history will furnish the material in proof of this view.

The Trachenberg plan of operations, in spite of its theoretical defects, was the foundation of the overthrow of Napoleon in 1813, but it would have remained fruitless had not the re-awakened spirit of the “Forward,” in Frederick the Great’s sense of the word, looked out for the acts.

After a long period of war now follows a long period of peace. Science, as a matter of course, was now busy drawing the lessons from the events and experiences of a grand and many-sided military activity. First of all they were occupied in the domain of military history. The deeds in this domain were, however, not remarkable. The critical stroke, the rigidly scientific foundation, was wanting. Indeed, military history, from the time of Xenophon’s “*Cyropedia*” (which was looked upon as a romance), up to the beginning of this century, with the exception of a very few writings—among which must be mentioned first and foremost the works of Frederick the Great on military history—had not passed very far beyond romance. Military history was largely one-sided, partisan, praising or blaming according to the stand-point of the historian—it could, therefore, only incompletely perform its proper function of being the best means of military instruction.

Only within the present generation has a change taken place in this matter. Military history has been following more and more in the footsteps of the latest approved method of research in general history, and can claim to-day—and for bringing about this state of affairs the leading place undoubtedly belongs to the Prussian General Staff—to be the best foundation for strategy and the most reliable advisor in military leadership.

But here we find once more in military history, even in official accounts, an attempt to disseminate incorrect views on war under a scientific cloak, in honor of a system of a strategy well known to be false. Field Marshal v. Müffling “inspired” the Prussian General Staff to bring out in the history of the Seven Years’ War his personal thoughts on military leadership, thoughts which were weighed down with a geographical and mathematical system both as regards strategy and tactics. This relapse to an antiquated form of strategy the Prussian General Staff redeemed in fine form in its later works.

The most prominent representatives in the domain of true strategy of that time were Jomini, Clausewitz and Willisen. I mention them in chronological order, as determined by the appearance of their most important works, otherwise Clausewitz would have to be mentioned first without any doubt at all. His work, “*Vom Kriege*,” will remain classical so long as there is any strategy. Therein are stated and clearly explained for all time the elements which limit and influence the Art of War.

Clausewitz once for all settled matters with reference to strategy, which at that time was working in complaisant, mechanical fashion with only abstract ideas, which for the most part were not even remotely derived from war. He put in place of these dead conceptions the living, the human. He helped the spiritual and moral factors—intelligence, patriotism, discipline, sense of duty, strength of character—to recover their true place as the pillars, as the “roots of all military deeds.” It is not my purpose to enter more fully into the strategy of Clausewitz—it will remain for all time an intellectual feat of the first quality, and exerted without doubt a decided influence on the spirit in which our last wars have been carried on.

The scientific system of Willisen, whose importance as a theorist is often, but unjustly underrated, is in so far not in accord with the views of Clausewitz that Willisen, led astray by the logical sequence of abstract views and influenced by the love of mere forms, so characteristic of all Germans, allowed himself to be induced to produce a veritable, elaborate *system* of strategy.

The independence of military judgment, the freedom of military action, are thereby too much confined and restricted, and that is opposed to the true nature of war. But men may think of Willisen's performance what they please—what he certainly did do was to point out in a striking manner the connection between military knowledge and military understanding, and most convincing in this connection is the answer which he gave to some one who referred to the difference between knowing and understanding, saying, the difference between knowing and understanding is indeed great, but much greater is that between not knowing and understanding.

Jomini made use in an ingenious way of a considerable practical experience to give an analysis of the Art of War, which shows manifold points of similarity with Clausewitz's teachings of war. This is due to the fact that both, leaving out of consideration Jomini's earliest work, “*Le traité des grandes opérations*,” which takes its starting point in the art of war of Frederick the Great, took the Napoleonic art of war as the principal starting point of their treatises. Still, the German is superior to the Italian (Jomini was an Italian) in depth of reasoning and largeness of views.

Just as it went with the classical writers in German polite literature, who also disseminated feelings and views for which their contemporaries possessed too little comprehension—I need only call attention to the national feeling and patriotism, to which Schiller gave such poetic expression, without finding any practical response in his contemporaries—so also did the classical writers in strategy fare.

Men had soon forgotten again in the long times of peace what decisive power had been inherent to the spiritual and moral factors in great wars—this could not be tested in time of peace, could not be made apparent. In its stead, however, peace furnished good opportunity for perfecting ourselves in the presentation and perfection of mechanical things, especially in the forms of battle tactics. Drill-ground tactics everywhere took precedence again, and just as the Prussian tactics fought with its most brilliant successes when founded on the simple drill exercises of 1726 and 1811 and the battle tactics connected therewith, just so characteristic is it that the decline in

battle tactics is combined with complex drill regulations, overloaded with prescribed forms.

As regards the Art of War between 1815 and 1859, we may remark that it did not in any way—as already indicated—conform to the teachings of a Clausewitz or a Jomini, or the models of the Napoleonic war time. The energy of execution seems to have fallen away. Peace is, in general, not particularly favorable for the development of ethical qualities or for the growth of self-reliant characters—but, aside from all this, the aims of the Art of War were very limited, as, for instance, in the different Russo-Turkish wars, in the wars of 1830-31, in the years of revolution, 1848-49, and even in the Crimean War, which was principally the attack and defense of positions, but in this last the superior intelligence of a Todleben was able to score great successes, and so did the powerful troop-leading of Radetzki in Italy.

The War of 1859 has, in a certain sense, a rather *dilletante* character—on both sides they lived strategically, so to speak from hand to mouth, and no grand thought, directed on a great object received expression. The commanders-in-chief on either side showed no great ability, nevertheless it must not be overlooked that on the French side the greater mental activity prevailed—in the Art of War as well as in the conduct of the battle—while on the Austrian side lack of self-reliance and a tendency to work according to a fixed pattern appear. At all events the campaign of 1859 was not conducted in the spirit nor according to the teachings of Napoleon I. or Archduke Charles.

This weakness of comprehension is most clearly apparent in the review of this campaign of 1859 by the Prussian General Staff. Here can already be felt the paw of the lion, who ejects all paltry strategical and tactical means, which played a great part then—here can already be recognized the acuteness of judgment, the far-seeing eye, which instructed through strategy in Military History, are soon to win unparalleled successes in actual troop-leading.

The campaign of 1854 shows in the plan of operations on which it was based, as well as in the mode of execution, as Prince Frederick Charles strove to conduct it, that even at that time the Prussian art of war was based on large-minded views.

The American Civil War is too widely different in its general relations from the European art of war to be for the latter of important or valuable significance. The lesson, too, which it was thought could be drawn from the attack and defense of fortifications and the so-called “raids,” should be carefully considered if we wish to make them of practical use for Europe. But it cannot be denied that the original superiority of the Southern States was above all due to the better scientific instruction of their corps of officers and rested on the great intellectual ability of a Lee, a Beauregard and a Jackson.

As regards the War of 1866, from the standpoint of strategy the criticism may be made—and this has often been done—that on the part of Prussia the “concentration of masses in a Napoleonic sense” was not borne in mind, and the advantage of interior lines was left to the adversaries. In the first

place, this advantage of interior lines could not be disputed with the enemy on account of the geographical position; and, in the second place, it would not have made matters easier for the Prussian leadership to calculate with abstract ideas and theoretical advantages—Prussia accepted the facts as they were, and endeavored to overcome the undoubted difficulties of the situation by energy and mobility. That she was so surprisingly fortunate was due in part, no doubt, to the assistance afforded her by the Austrian plan of operations, which was one based on an incomprehensible theoretical foundation.

This plan of operations sets aside at the very outset the simplest principles of strategy in not bringing to bear the great advantage of interior lines of operation. All the calculations of the Austrian General Staff lie under a fatalistic ban, as it were, inasmuch as it is assumed as a foregone conclusion that the Prussian army will certainly take the offensive, and that therefore the Austrian army must remain in the beginning on the defensive. Moreover, they assumed as certain a Prussian offensive movement against Moravia; much was said in the plan of operations of the fortification Olmutz, of a siege of it, of defensive positions, but very little of actual attack, of any effort to bring about a decisive action. In reading this plan of operations one is carried back to the times of 1794, when the spirit of Mack still ruled. How little the Prussians were prepared to see the Austrian leaders renounce so entirely the modern views on strategy is evident from the fact that, in the work of the Prussian General Staff, on the appearance of which the Austrian plan of operations was not yet known, it was assumed as a matter of course, in the discussion of the Prussian plan of operations, that the Austrian leaders would not give up the evident advantage of interior lines and of a timely offensive movement. But they were completely deceived. And yet there stood at the head of the Austrian Northern Army a general who, as a leader in war, had already won laurels.

I think that it should be stated, in explanation of this surprising fact, that here men sinned against the first principles of modern strategy, that they allowed themselves to be led into false conclusions through the results of the military operations in the year 1859. The Austrians opened that campaign with an offensive movement—and such was held by strategy to be the highest principle of a successful mode of conducting war. This offensive movement failed. It did not fail, however, because it rested on a false theoretical basis, but because it was no true offensive at all. That weakly, slow, dilly-dallying advance in Piedmont has nothing in common with a definite and determined offensive, which goes straight on to the mark regardless of consequences, which does not allow itself to be prevented from attaining its object by any side issues, by any paltry considerations. Had the Austrian offensive borne this character, as is required by the principles of the science, there would probably have been some chance of fighting the enemy in detail, and perhaps making a brilliant campaign.

But while the Austrians allowed themselves, directly on account of the failure of the offensive in 1859—and contrary to the principles of strategy—to be forced into a defensive attitude in the year 1866, they adopted for the battle, in conformity with the military experiences of the year 1859, the shock

tactics in imitation of the French. But in this, in spite of their military experience, they reasoned on false premises. They forgot the needle-gun and, what was of far greater importance, they forgot to take into account the greater tactical mobility of the enemy. Thus they had, in a partial and mechanical estimation of their own military experiences, lost the true measuring rod, as well for the reality of things as for the substantiation of theory.

In pleasant contrast to this stands the method of procedure of Archduke Albert in Italy. Archduke Albert had been known up to this time as a man of reflection, of earnest study, herein following the example of his father, Archduke Charles. Archduke Albert, who was regarded as a learned soldier in comparison with Benedek, made the theory of the advantages of interior lines of operation a reality under the most unfavorable circumstances, the victory of Custoza—he had to take the offensive without hesitation against a far superior enemy; while in Bohemia the theory of interior lines, under the most favorable circumstances imaginable found no realization, the salvation of the Art of War being there believed to lie in the defensive. Archduke Albert proved by actions that strategy is most certainly called upon to constitute the foundation of military leadership, but one must have also the courage, the insight, to apply this principle energetically and judiciously.

The lessons of the War of 1866 were really not drawn outside of Germany until after the Franco-Prussian War, for then it would no longer do to ascribe the overpowering successes of the Prusso-German army to luck, to accident, to extraneous matters, instead of to a thorough and superior generalship. The French entered the war with the strategical assumption that they would probably succeed in breaking through Southern Germany with united masses, according to the pattern of the methods of Napoleon I., and thus make an opening in the German line. They proposed to show the “learned” Prussian General Staff what practical strategy is, the most celebrated representatives of which were the marshals Mac Mahon and Bazaine. Similarly with their views on battle-tactics, the French were convinced that, with the help of their “African experience,” their superior military knowledge and their so-called sound common sense in military matters, they could easily get the better of the complicated German tactics.

This sound common sense plays in war as in peace—especially in the latter—so great and easily misunderstood a part so far as the theory of war is concerned, that it may be worth while to consider this matter a little more in detail. It played such a part, for instance, in the Prussian army before 1806, when it was generally acknowledged, particularly by those who were of the opinion that formal drill is more important than the training in battle tactics. In Austria, before 1866, it was regarded as a sign of good common sense when any one regarded skirmish firing as a secondary consideration and the shock of closed masses as the principal thing. Sound common sense is certainly in military as in other things the foundation of all success. But, in the first place, every one will think that he himself possesses it, and hence it would have to be very widely disseminated, and cannot therefore constitute a special endowment; in the second place, from this universality of common sense it follows that it is also disseminated through other armies,

hence it cannot by itself confer superiority. This superiority—and one always desires to be superior to the enemy—can only arise from perfecting sound common sense, subjecting it to a continued course of exercises in theory and practice, filing it down, polishing it; then it will be able to solve problems in war which require intelligence, not simply routine. Now, this routine, which, is so often mistaken for practice, is often also designated a school, and since the last great wars foreigners speak often of a German school of strategy as well as of military leadership. I think this conception is not appropriate. It is intended to convey a compliment, but it is none. From the idea of a school is inseparable that of the orthodox, the mechanically teachable. But such a conception and such treatment strategy will not endure; for, aside from comprising certain fixed principles, it must be alive and active; but much less will it endure such treatment for the reasons which have already been repeatedly touched upon.

In attempting to characterize the Prusso-German military leadership from 1864 to 1871, the comparison with the Prusso-German politics of the last twenty-five years, which is called one of realism, involuntarily obtrudes itself. Just as German politics, free from all doctrinarianism, free from all one-sided special school influences, worked only with the reality of things, so the German military art endeavored to act, free from all pre-conceived ideas and abstract theories, conforming simply to reality, in which it had the indisputable advantage of receiving, on the basis of a classical strategy, an excellent intellectual training.

But, just as the foundations, the moving springs of German politics were always ideal and ethical in character, and still are, even so the Art of War was supported and ruled by spiritual and moral factors, unharmed by the realism of its mode of action. These spiritual factors were the superior intelligence not only of the commander-in-chief but of the entire corps of officers. These moral factors were the same as those which Clausewitz designates as the true pillars of all military success in his teachings on war.

All these factors worked together and gave our military leadership a distinctive character—above all they gave the generalship the stamp of genius, clear and sure in its character.

In connection with a rather mechanical conception of the German mode of conducting war, certain Shibboleths have come into use, which are often given out as the essence of German strategy. Such Shibboleths often do more harm than good. The wise man they make no wiser, the foolish man they only confuse—he will in all probability apply them where they do not belong. The Russians, in the War of 1877, had sad experience at first with their “unrestricted venturing,” with their advance in separate columns—because they proceeded in a purely abstract way, without properly taking into consideration the actual circumstances. The Servians, in 1885, “marched divided” and expected to fight combined—but were in the end defeated while still divided.

Now, with reference to the present state of strategy, there appears to have arrived in this purely intellectual domain, in striking contrast with the restless struggle of all the world in the domain of war material, a period of preparation, of rest. An unprejudiced general view of the situation shows

that in all armies almost the same ideas, the same teachings prevail—as was the case once before, some hundred years ago. A considerable advance beyond other nations in the conception of the nature of war, in strategy, no army can any longer hope to make, hence it follows that in the Art of War too, almost the same principles will be accepted everywhere.

To sum up briefly the generally accepted ideas on the Art of War of to-day, there are three things that must be sought after as the foundation for success. These are: unity of action, simplicity and energy of execution.

Unity of action is essential, because this alone can insure the uniform working in concert of all means and power toward a common end. But, in spite of railroads and telegraphs, in order to preserve unity of action in all the phases of war, there is much greater friction to overcome than formerly in all the spheres of military action, because in consequence of the enormous armies, the difficulties have naturally increased. It is to-day no longer possible to do what Frederick the Great could do at the Battle of Soor, viz.: correct in a quarter of an hour an unfavorable military situation by making a bold tactical decision and following it up at once by its execution. At that time the army was commanded as a division is now. At that time mistakes, even in the strategical concentration of the army, could be corrected in a comparatively short time—as late as the campaign of 1809 Napoleon was able to do this—but in the military leadership of to-day mistakes in the original concentration and advance can hardly be corrected.

The principal means of nevertheless preserving the unity of action consists in bringing about in an army a certain unanimity of opinion on the nature of the Art of War by an appropriate system of general intellectual training. This training must, however, be entirely free from all forms, else the object sought will not be attained, viz.: the promotion of general intelligence in such a way that, in spite of all the independence of the parts, community of purpose will result of itself. It must not be considered an easy task to bring about such a state of affairs, but still the glorious wars of Emperor William show that this is possible, for these very wars are characterized—especially those of 1866 and 1870-71—by unity of command.

The present political situation in Europe has, however, so much enlarged the problems of the Art of War that the unity of action will be still more difficult to preserve than in the last wars. On the other hand, these same political considerations may set tasks for military leadership, than which no grander can be conceived, when we reflect that it is possible to direct armies numbering in the millions towards one fixed object.

The simplicity of action in war is perhaps more difficult to attain than unity—and in this, first and last, the character of the leadership must decide. Does the latter know how to work with great intellectual means—the simplest is always the most difficult—quietly and clearly, its effect will be felt down to the smallest subdivision in quite as uniformly favorable a way, as in the reverse case it will act unfavorably.

Finally, the energy of execution depends externally mainly on its simplicity and unity, internally on ethical and intellectual factors. The energy of execution can only be the result of a harmonious, resolute co-operation of all these factors, based on the greatest possible completeness of war means.

But all these sciences of war here developed are still only built on sand, if in war the spirit of enthusiasm, the *furor teutonicus*, the devotion unto death, the most unselfish sense of duty and all those things which "none can imitate,"—in which is included the strength and superiority of the German spirit,—if these do not furnish the firm foundation pillars for the *military leadership!*

THE ROLE AND ORGANIZATION OF SEA-COAST BATTERIES.*

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THE great changes undergone by naval material since the appearance of the first ironclads have necessitated a complete overhauling of the system heretofore in vogue in the defense of coasts by artillery.

While the navy has increased by enormous proportions the offensive and defensive powers of its fighting units, at the expense of the number, we have been led, by an analogous progress, to reduce the number of batteries, and to concentrate the defense on a small number of strategic points, the protection of which is of primary importance, such as the entrances to important water ways, military arsenals, and great commercial ports. This action, which was imposed by the increased cost required to construct and arm new batteries, is, in addition, justified by the consideration that portions of the coast of secondary importance do not constitute any longer objectives for hostile forces seeking to attack the coast. The system of continuous occupation and surveillance is from henceforth abandoned, in order that all the resources of the defense may be accumulated around those points, the preservation and protection of which affects in a decided way the commercial prosperity and military power of the country.

But the reduction in the number of batteries, their new uses and the development of their armament are not the only consequences of the new order of things. The progress of artillery has singularly lessened the defensive qualities of earth-works and masonry forts, while, on the other hand, ironclads are much less vulnerable to new projectiles than were their predecessors—the wooden ships—to the projectiles of the old smooth-bore cannon. In an artillery struggle between a low coast battery, firing in barbette from behind an earthen parapet, and an armored ship of recent model, conditions as to field of fire, precision of fire, number and calibre of pieces being the same for each, the advantage ought to be decidedly with the ship, as the armor covering its vital parts yields protection in part at least against the fire of the battery, while the battery, with its pieces and cannon-eers exposed, can be entirely destroyed by a few well-aimed shells. The old

* From Vol. XXVIII., *Revue d'Artillerie*.

type of low coast battery has been abandoned. The effort has been made in France, and to a greater extent abroad, to increase the defensive strength of coast forts by the use of armor, but this system is too burdensome financially to admit of general use; and it has been necessary to seek, in a complete reorganization, dispositions offering greater latitude in order to neutralize the inferiority of the coast battery, and, if not restoring it to its old position of superiority, at least permitting it to fight its new adversary on equal terms.

To put clearly the principles which ought to govern in establishing, organizing, and arming sea-coast batteries, stating precisely the true conditions of the struggle between batteries and armored ships, is the aim of this study.

CHAPTER I.

ON THE ALTITUDE OF BATTERIES.

1.—Influence of Altitude on Batteries from a Defensive Point of View.

Dead-angles.

There exists around elevated batteries a circular zone, of variable extent, which cannot be reached by the fire of the guns, due to the limitation imposed by the carriage or parapet in using angles of depression. If a piece situated at a given altitude be laid with the maximum angle of depression, the point at which the projectile strikes when the gun is so aimed determines the radius of the zone of the dead-angle for the piece and position.

On the other hand a ship cannot approach a high battery beyond a certain distance, which depends upon the maximum elevation that can be given to the ship's guns. The circle traced around the battery with this radius constitutes, in some degree, a kind of a zone of invulnerability for the battery, and, according as this circle is interior or exterior to the zone of the dead-angle, there will be a resulting advantage to the ship or to the fort. In the first case it will be possible for the ship to fire with effect against the battery and yet be screened from the fire of the battery; in the second case, there will be an annular region in which the ironclad will be forced to receive the fire of the fort without being able to reply to it.

It is important, then, in this connection, to glance at these fundamental conditions of artillery opposed to war-ships.

Attention will be confined to guns protected by armor, which, alone, would be able, in a prolonged struggle, to meet the fire of fort guns. It goes without saying that guns not protected, and especially artillery of small calibre mounted in the open on deck or aloft, will be speedily silenced by the plunging fire of the high battery.

Protected guns of large calibre may be divided into three classes according to the three principal types of armor covering them, the basis of division being the maximum angle of elevation attainable with each:

1st. Pieces firing through embrasures from a redoubt.

Type: ironclads with central fort, *e. g.*, *Hercules*, *Sultan*, *Temeraire*, *Alexandra*, *Superb*, *Belle Isle*, *Orion*, of the English navy.

2d. Pieces mounted in revolving turrets.

Type: movable turret ships, *e.g.*, *Monarch*, *Neptune*, *Devastation*, *Thunderer*, *Dreadnought*, *Inflexible*, *Ajax*, *Agamemnon*, *Colossus*, *Edinburgh*, *Conqueror*.

3d. Guns mounted in fixed turrets in barbette. This is the disposition that has been adopted exclusively in France and abroad in recent years, *e.g.*, *Collingwood*, *Rodney*, *Howe*, *Benbow*, *Anson*, *Camperdown*.

In the first class the maximum angle of elevation does not much exceed 6° or 7° for guns of 24 c.m., and larger.

In the second class, the limit of fire in a vertical direction is generally between 10° and 12° .

In the third class this limit varies according to the calibre of the gun, and does not exceed 10° for the largest pieces.

A broadside ship or a redoubt ship whose pieces have for their maximum angle of elevation 6° would be able to act against a battery having an altitude of 40 to 50 m. from any point along the circle that marks off the dead-angle zone; but, against a battery of greater altitude, the ship will have to stop at a range beyond the dead-angle zone.

With guns which can fire up to 7° elevation the ironclad would have the advantage against all batteries having an altitude less than 90 m., but against batteries more elevated the vicinity of the dead-angle zone would be denied to the ship.

Thus the placing of artillery in broadside or in redoubts on shipboard would seem disadvantageous to the ship when acting against high batteries. But the principal objection to the system from a naval point of view is, that it places altogether beyond the reach of fire all points of the coast above a certain altitude; thus batteries situated more than 105 metres above the water could not be attacked by 24 c. m. guns with a maximum elevation of 6° , because the highest point of the trajectory of this gun under 6° elevation is 105 metres; for an angle of 7° the limit is 139 metres.

For pieces in the second and third category, allowing an angle of elevation of 10° , the conditions are entirely different; as long as the altitude of the batteries is less than 250 metres these pieces can act against the battery from within the dead-angle; it is only above this altitude—which is indeed considerable and rarely exceeded—that batteries have restored to them the advantage over the ironclad.

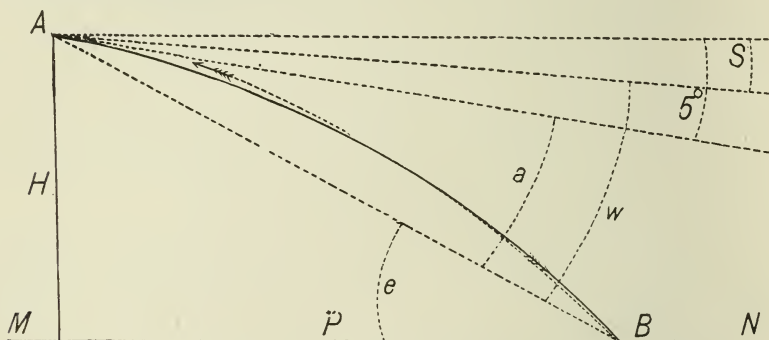
Broadside ironclads and central redoubt-ships are abandoned now in France and abroad; the latest models of war-ships launched or on the stocks are all of the fixed or movable turret type.

It may then be affirmed, in a general way, that in the attack of a high battery, limited in its fire to an angle of depression of 5° , the ironclad will be able to anchor or manœuvre within the limits of the dead-angle zone—that is to say beyond the reach of the battery, and still be able to fire effectively on the battery.

This is one point in which the defense is inferior to the attack, but it is easy to be convinced, by examining further, that the danger is more apparent than real. The region situated within the dead-angle zone of a fort is always under the flanking fire of neighboring forts except in very unusual cases; regarded, therefore, from the point of *general* defense it is a very small

disadvantage. In so far as the defense proper of the battery is concerned it may be said, that an ironclad manœuvring in the dead angle zone is not very dangerous to the battery; under the most favorable conditions, that is when the ship stands just inside the dead-angle zone circle, the projectiles from the ship reach the fort with an angle of fall almost the same as the angle of depression (5°) under which the guns of the fort can fire.

Suppose (in the figure) an ironclad to be situated at B, at the limit of the dead-angle zone from the battery at A, which is at an altitude H above the water level MN.



Let: ϵ be the angle of the altitude H subtended at the position of the ship.

δ the angle under which the projectile from the ship reaches the battery, being regarded positive below the horizontal plane passing through the interior crest of the battery.

α the angle of projection required to give the range P (horizontal distance between A and B).

ω is the angle of fall of the ship-gun's projectile corresponding to the range P.

From these relations we have:

$$\begin{array}{ll} \delta = \epsilon - \omega & \\ \text{but} & \epsilon = 5^\circ + \alpha \\ \text{hence} & \delta = 5^\circ + \alpha - \omega \end{array}$$

But since we are dealing with low velocities ($\alpha - \omega$) is always very small, hence δ is always nearly equal to the angle of depression under which the battery gun can fire, in this case 5° .

In proportion as the ship approaches nearer to the battery δ will grow larger and larger.

Now it is evident that with the exception of the very rare case in which a projectile reaches directly a piece or a carriage, the effects of such fire give little cause for fear, because the high shots will pass over the work and the low shots will bury themselves in the parapet.

Projectiles of the 34 c. m. gun when fired, against batteries at different altitudes, would arrive at the battery in a horizontal direction from the distances given in the second column of the following table, the batteries being

placed at the altitude given the first column, and the dead-angle zone being as given in the third column :

Altitude of Battery.	Distances for which $\delta = 0$ 34 c. m. gun.	Radius of Dead-angle Zone.
Metres.	Metres.	Metres.
25	1030	275
50	1420	510
75	1690	725
100	1925	915
125	2125	1080
150	2295	1250
175	2455	1405
200	2600	1550
225	2730	1685
250	2855	1815
275	2975	1940
300	3090	2060
325	3195	2165
350	3295	2275
375	3390	2375
400	3485	2475

An examination of this table shows, that, far from being able to profit by the cover offered by the dead-angle, the ironclad attacking a high battery ought to stop at least 1000 metres short of the limit of this zone, under pain of having its fire become almost useless.

The importance of altitude appears then in that it denies to the enemy's ships near approach to the battery.

If we consider the attack of an ironclad standing broadside against a low coast battery, at 1000 metres for example, all the chances are in favor of the ship ; unless a fortunate shot from the battery reaches some vital part of the ship, after having made a breach in its armor, the destruction of the battery will be only a question of a few minutes.

But, in proportion as the range increases, the precision of naval fire diminishes rapidly, while shore fire is much less influenced by distance ; this is evidenced by recent naval operations against coast batteries, it is, then, to the advantage of shore batteries to fight at the longer ranges.

Some additional conclusions may be drawn, viz. : if the scarp wall of the fort be visible from the sea, it will be possible and easy to breach it from the interior of the dead-angle zone, for it is of little importance whether the angle of incidence of the ship's projectile on the scarp be a little above or a little below the normal to the wall, provided it be nearly normal. But this ought never to happen in works constructed with the regular profile ; that is to say, in works with a ditch and with a glacis in prolongation of the superior slope, or even in works whose scarp walls are defiled from sight at a distance. Projectiles will arrive under an angle with the horizontal almost always less than that of the superior slope, and when this is so, breaching fire is not possible, if the scarp is defiled from view from the sea. Shots falling short will bury themselves in the glacis without producing any damage pro-

vided the earth mounds have sufficient thickness; high shots will pass over the battery, and only those shells are to be feared that skim along the slope of the glacis and burst at such a point that the fragments will strike the scarp, and even these will produce a diminished effect because the axis of the cone of dispersion will incline upward.

It may be said, therefore, that the existence of a dead-angle zone around a battery does not present any danger to the battery itself. It is true that certain works have defects, regarded from this point of view; at Toulon, for example, the fort of the Colle-Noire and that of Cape Brun present distinctly visible scarp walls, unprotected by earthworks from the sea side. At Cape Brun the front face of the two-story barracks which occupies a part of the court is visible even from the foot of the escarpment. These are defects of construction which it is important to specify and to correct, but are not cited as arguments in discussing the advantages and disadvantages inherent in high forts.

The considerations which have preceded bring out the enormous advantages resulting to a battery by reason of the altitude of its site above the level of the sea; in a combat with an ironclad, a battery situated between 200 and 300 metres high will be in excellent condition to carry on the struggle, because, at short ranges, the projectiles from the ship will arrive from below upward, and at long ranges naval guns will lose much of their precision.

It thus appears that altitude is the first thing to be sought in a battery of bombardment, that is, a battery whose action extends to a distance and which is not established especially to defend a narrow channel.

In regard to the dead-angle produced by the inability of the guns to fire under an angle below -5° with present carriages, we have seen that this does not merit serious attention; in the first place, because the battery has almost nothing to fear from an ironclad manœuvring in this zone, and, secondly, because the ironclad will be exposed there to the fire of neighboring batteries. This is not to assert that the angle -5° is one that cannot be exceeded; when our carriages are arranged so as to allow a greater angle of depression than -5° , we shall be able to employ them at certain places where the configuration of the coast does not lend itself to a concentration of fire from neighboring batteries. But it must be kept in mind that the ability to fire from batteries under great negative angles requires a steep superior slope entailing a weakening of the parapet and a diminution of protection for men and materiel.

2.—INFLUENCE OF ALTITUDE ON COAST BATTERIES REGARDED FROM AN OFFENSIVE POINT OF VIEW.

The important effect of altitude regarded offensively is, to increase the efficacy of fire on the decks of ships. It may seem, at first glance, in considering the apparent dimensions of the deck, that the chances of hitting it are very small, and cannot be sensibly increased by any increase of altitude. But the apparent dimensions of the object aimed at has no influence on the efficacy of the fire; it enters into consideration only in pointing; it is conducive to quick and accurate pointing that the object aimed at be easily seen and clear cut, but it is not necessary that its apparent dimen-

sions be considerable, on the contrary, the form most advantageous, regarded solely from the point of facility of aiming, is a simple line.

In considering the efficacy of fire it is necessary to treat first, of the probability of striking the object, and, secondly, the effect of the projectiles on the object.

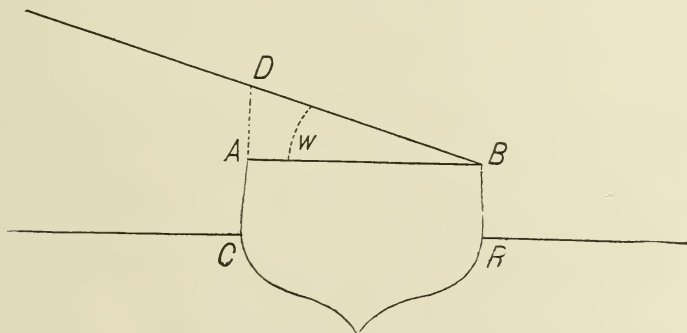
1. *Probability of Striking the Object.*

Let us take for example the 24-c.m. gun firing with battering shell of 144 kg. weight, and suppose that the vessel stands with broadside to the battery, that is, in the most disadvantageous position in so far as the efficacy of fire with reference to the deck is concerned.

If 15 metres be adopted as the width of the deck, it appears that the probable error in range is less than this width up to 3200 metres; at 6300 metres it is only 20 metres. With the ordinary shell the probable error in range is only two-thirds of the width of the deck at the shorter range, and does not equal it until a range of 6350 metres is reached. It cannot therefore be said that the chances of striking the deck are very small.

If it be desired to compare the chances of hitting the deck with the chances of striking the side of the ship it may be done as follows:

Let DB be the final element of the trajectory. AC is the height of the deck above the water-line. AD is an imaginary position of the side which will receive all shots striking the deck,



$$\text{Now } AD = AB \tan \omega = 15 \tan \omega.$$

If the distance of the deck above the water (AC) be assumed to be 6 metres, the chances of hitting the deck and of hitting the side may be compared for different distances and altitudes. It appears that between 0 and 7000 metres the ratio of chances varies, as 0 to 1 for altitude 0, as 0.25 to 1 for altitude of 100 m., as 0.40 to 1 for 200 m., as .50 to 1 for 300 m., as .60 to 1 for 400 m. At 2500 m. a deck 15 m. wide is equivalent to a vertical wall 1.4 m. high, in so far as the chances of hitting it are considered from an altitude of 0 m., of 2 m. for an altitude of 100 m., of 2.6 m. for 200 m. altitude, of 3.25 for altitude of 300 m., of 3.85 m. for an altitude of 400 m.

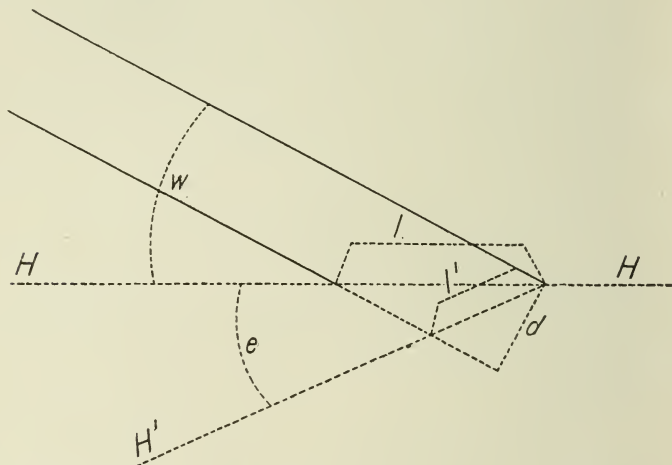
It is thus illustrated very clearly:

1st. That the chances of a high battery striking the deck of a ship are by no means to be neglected; they are, indeed, comparable to the chances of striking the side.

2d. That increase of the altitude of a battery increases markedly for all

fighting ranges, the height AD of the vertical panel which receives all shots that strike the deck.

In order to give an exact idea of the chances of hitting the deck of a ship at different distances it is sufficient to compare the width of the deck with the probable errors of range; but the errors given by the usual tables give only those for batteries situated near the water-line; for elevated batteries it is necessary to correct such errors by quantities which depend on altitude.



Let l represent the probable error in range for 0 altitude (as given by the tables).

α is the angle of fall given by the tables.

For a high battery the angle of fall will be $(\omega + \epsilon)$, ϵ being the angle subtended at the ship by the site.

Calling l' the new probable error we have :

$$\delta = l \sin \omega = l' \sin (\omega + \epsilon).$$

A discussion of these relations leads to the same conclusions as before :

1st. The chances of hitting the deck of a ship are far from being negligible.

2d. An increase of altitude increases decidedly the chances of hitting the deck.

We have just seen that in the most unfavorable case (that is, when the ship presents her broadside to the battery) the chances of hitting the deck are appreciable and comparable to the chances of hitting the side, and that these chances increase with the altitude of the battery. If, on the contrary, the ship stand bow on, then the chances of hitting the side or prow become very small, and almost all the shots will fall on the deck.

In reality the ship will take up a position more or less oblique to the battery, of such a nature that, in a general way, it may be said that the chances of striking the deck are about the same as the chances of striking the side.

2. The effect of the projectiles on decks.

It is generally admitted that protected decks cause all projectiles to ricochet that strike under an angle of less than 10° , and that armor-piercing shells begin to make a breach at about this angle when the thickness of the plate covering the deck is less than the fourth part of the thickness regarded necessary to resist the normal impact of the same projectiles.

In applying this rule to the 24-c.m. gun model of 1876, it is found that the angle of fall of the armor-piercing shell is not 10° until at 4000 m.; at this distance the remaining velocity is 304 m., and this velocity will under normal impact carry the shell through 168 mm. of plate; it appears, then, that 42 mm. of deck covering would keep out this shell at this range.

It is true that for an angle of fall in the vicinity of 10° the normal component of the velocity of the projectile is a little smaller than one-fourth of the total remaining velocity, since the sine of 10° is 0.175, and consequently the thickness of the plate which ought to resist a projectile arriving under the angle of 10° is at the maximum one-fourth thickness of plate necessary to resist normal impact. But, in proportion as the angle of fall increases, the value of the normal component of the remaining velocity increases, and, consequently, the effect of the fire on the deck approaches more and more to that of normal impact. A moment may then arrive at which, although the remaining velocity may go on diminishing, its normal component may be sufficient to perforate deck armor at the maximum of 42 mm.

In general, for a given altitude of battery, and for a given thickness of deck armor, there are two zones of perforations, separated by an intervening zone, in which the deck-armor is not perforated.

The first zone is, ordinarily, almost entirely within the dead-angle zone. The width of the intermediate zone varies in a marked degree with the altitude; with the 24 c.m. gun, and for a deck armor 30 mm. thick, it vanishes at about 325 m.; that is a 24 c.m. gun placed 325 m. high can perforate a 30-mm. deck armor at all ranges. For a thickness of 40 mm. the zone of invulnerability is very wide, its radius varying from 6040 m. to 4530 m. as the altitude of the battery varies from 0 to 400 m.; for a deck-armor 50 mm. thick the radius under the same conditions varies from 6620 m. to 5640 m. It appears, then, that only deck-armor of less than 5 c.m. thickness ought to be considered attackable by the 24 c.m. gun model of 1876.

Now the most recent types of ironclad have their vital parts protected by 30 c.m. of armor and above, and have deck armor of 6, 7 and 8 c.m. In England the thickness of deck armor for several years has been 76 mm. (3 inches); in France it is from 8 c.m. to 9 c.m. It may be considered that the protection thus assured to the deck is almost of the same degree, in relation to direct fire, as that given to the water line and the ship's vital parts by 30, 40 and 50 c.m. of armor. It is not surprising, therefore, that the 24 c.m. gun, which is powerless to perforate the sides of such ironclads, is equally ineffective against armored decks.

But the question of the effect of fire on decks should be examined further. In reality it is not, as a rule, the upper deck which is armored, but that which is just above the water line; the protected deck, when there is an armored belt, is attached to the upper edge of the belt and

joined to it in such a way as to cover entirely all of the ship below the water; above this protected deck is generally found one, two or three wooden decks resting on sheet iron 10 to 15 mm. thick; these decks will always be traversed by 24 c.m. projectiles arriving under an angle of 5° and over. Altitudes greater than 60 m. will always give an angle greater than 5° . Admitting then that 24 c.m. projectiles are without effect on armored decks carrying 5 c.m. or more of armor, they will nevertheless produce great damage in these upper decks; in ships with a central fort they will penetrate within the battery, the ceiling of which is an ordinary unprotected deck; in ships having barbette turrets the large guns are equally exposed to plunging shots and are protected only against horizontal fire. Two or three shots from 24 c. m. guns falling in the battery or the turret will be enough to utterly ruin the guns of the ship, and consequently place it *hors de combat*.

The considerations which have been developed in reference to 24 c.m. guns are equally applicable to all calibres, and it may be stated as a conclusion that altitude increases in a marked degree the effect of projectiles on decks.

Beyond an altitude of 60 m. the angle of fall is always greater than 5° , and ordinary shell with percussion fuse will perforate all decks not covered or protected by armor of 12 to 15 mm.

Beyond an altitude of 220 m. the angle of fall is always greater than 10° , and under these conditions the zone of invulnerability for protected decks is zero for armor-piercing shells when the total remaining velocity is sufficient.

To summarize: it is seen that the chances of hitting the decks of ships by direct fire are substantial and comparable to the chances of hitting the side; with special reference to the 24-c.m. gun model of 1876 a few fortunate hits of ordinary shell with percussion fuse striking the unprotected deck of an ironclad are very effective and would probably place the ship *hors de combat*; in reference to the fire of armor-piercing 24 c.m. shells on protected decks their efficacy will be at least very problematical and of the same nature as that of the same projectiles against the sides of ironclads. In order to act effectively on protected decks it is necessary to resort to the use of rifled mortars of large calibre, such as the 30 c.m. mortar recently adopted by the marine artillery. In all cases altitude increases decidedly the chances of hitting and the efficacy of the fire, and brings, consequently, to sea-coast batteries inestimable advantages.

CHAPTER II.

DISTINCTION BETWEEN BATTERING BATTERIES AND BOMBARDING BATTERIES.

THEIR RESPECTIVE ROLES.

Recently exception has been made to sea-coast batteries on account of their deficiency of power resulting from the small calibres which compose their armament. Guns of 19 c.m. and 24 c.m., the system of which is almost analogous to the model of 1870, correspond to the first phases of the struggle

entered upon between artillery and iron-clads. For a long time the thickness of armor used on ironclads has been greater than that which can be perforated by guns of 19 c. m. and 24 c. m. calibre.

The angle of incidence varies directly with the range, with the altitude of the battery, and with the inclination of the sides of the ironclad at the moment of impact. Taking into consideration all possible inclinations of the ship's side, all possible angles of fall, and all possible altitudes, it may be said that, considering 2000 m. as the extreme limit of battering fire for 19 c.m. and 24 c.m. guns, they can only be effectively employed against forged iron plates of 12 c.m. to 20 c.m. thickness.

It is quite certain, therefore, that batteries armed with 19 c.m. and 24 c.m. guns will not be able, generally, to produce serious damage in the vital parts of ships protected by 30, 40, 50 and 60 c.m. of armor. The conclusion is therefore reached that sea-coast batteries, in their present state, would not be able to render any adequate service against ironclads, and that guns of 19 c.m. and 24 c.m. ought to give place to more powerful calibres.

In order to give a full account of the value of this objection, and in order to acquire a precise conception as to the most suitable armament to give the batteries, it is important to refer to and to brush aside a confusion of ideas often existing in regard to "battering" and "bombarding" batteries, and to establish clearly the respective rôles of these two kinds of works,

1. *Battering Batteries.*

Battering batteries have for their object the defense of channels, entrances to ports and roadsteads; they will have to act against ships which pass before them with greatest possible velocity. The duration of their action will necessarily be very short. They ought not to have a very extended field of fire, because, otherwise, they would be able thus to be attacked from a distance by ironclads, and would find themselves ruined and beyond the power of rendering any service at the moment the attempt is made to force the channel that they are designed to defend. Therefore they ought to adhere closely to the work of defending the pass with the heaviest blows, protecting themselves by the natural relief of the ground, or building, if necessary, artificial traverses. From this will naturally result a diminution of the field of fire in a lateral direction, which will contribute, again, to reduce the duration of their action.

A ship having to pass over a fortified channel will seek to develop its best velocity in such a way as to be the shortest possible time under the fire of the defense; the batteries will have available barely a few minutes during which each piece will be able to fire only one or two shots, and if the passage is attempted by main force by several ships at the same time this small number will have to be distributed among several objects. The question is, however, to stop the progress of the ships, to sink them or at least to cause them such serious damage as to place them *hors de combat*. Such a result can be attained only by giving to the limited number of blows great power and accuracy; that is to say, that the armament of battering batteries ought to be composed of guns with very large calibres, capable of perforating armor of the highest resistance. The range of 2000 m. may be considered as a

maximum beyond which the fire is too uncertain and the projectile energy is too small. Emplacements ought to be chosen, then, at points along the coast as near as possible to the ship channels through which vessels of war will have to pass, narrowing, if need be, the channel by dykes or other artificial obstacles. As a matter of consequence heights are not suited to batteries of this nature, because at short distances even a slight elevation has a material influence on the angle of fall, and an increase in the angle of fall would have the effect of diminishing the extent of the danger zone and consequently the chances of hitting. The following table enables us to appreciate the reduction in the danger zone for the 34 cm. gun (model 1875) between the ranges 1000 and 2000 m. corresponding to changes in altitude from 0 m. to 200 m., taking 6 m. as the height of the object fired at.

Range in Metres.	Extent of Dangerous Zone in Metres for 34-c.m. gun for Altitudes of					
	0 m.	25 m.	25 m.	100 m.	150 m.	200 m.
1000 m.	258 m.	124 m.	82 m.	49 m.	35 m.	27 m.
1200 "	206 "	121 "	85 "	53 "	39 "	31 "
1400 "	172 "	114 "	85 "	56 "	42 "	34 "
1600 "	147 "	107 "	83 "	58 "	45 "	36 "
1800 "	129 "	100 "	80 "	59 "	46 "	38 "
2000 "	108 "	88 "	75 "	57 "	46 "	39 "

The effort to obtain high sites for such batteries would, besides, except in very special cases, operate to remove the batteries far from the water's edge and thus to increase ranges, which would be a serious objection.

Battering batteries are, then, primarily, low batteries near to the shore line, and their low site, which exposes them more to the fire of naval guns, is an additional motive urging that they be defiled from distant fire.

To recapitulate: battering batteries have a special and perfectly distinct object, namely, to defend narrow channels, the entrances to harbors and anchorages; they are low batteries defiled from distant view, having a very limited field of fire, firing at short ranges with certainty of hitting, armed with pieces of the largest calibre.

2. Bombarding Batteries.

Bombarding batteries have another rôle to play. They are designed to hold the ships of the enemy at a distance in order to prevent them from bombarding the forts, arsenals and cities, to prevent an attempt to land or any operation whatever against the coast. The radius of action of these batteries ought then to be as extended as possible; in return, they can be attacked from a distance and from several points at the same time, and, in a fight which may last several hours, open batteries could not resist the fire of ironclads, if their inferiority from a defensive point of view be not compensated by special advantages, and if they be not able to support each other; both of these conditions are met in elevated sites.

It has been shown above what immense advantages altitude gives to batteries. The ranges in this case being without limit, the reduction of the

dangerous zone is altogether of secondary importance, and this disadvantage is largely made up for by a greater efficacy of fire on the decks of ships. But while the battery fires on the ship with a plunging fire, the latter fires on the battery from a lower plane, and, if the battery has a regular profile, or even if the scarp wall is defiled from distant view, and if the parapets have sufficient thickness, the fort will suffer very little from such fire. The fire from an armored ship against a high battery will be really effective only from a distance, in which case the angle of fall is so great as to reach the terreplein and carriages behind the parapet. This distance is considerable for altitudes of 100 m. and above. The first effect of altitude will be then to oblige armored ships to stand off at long distances from the batteries being attacked, and it is well known how much naval fire loses its precision when the range exceeds 1500 or 2000 m. Experience shows that accuracy of fire decreases much more rapidly for guns afloat than for shore guns, even supposing the ship to be in motion. Increase of fighting range is, therefore, a condition favorable to coast batteries.

It has been shown, likewise, that increase of altitude augments considerably the efficacy of fire on decks, protected and unprotected, which are the most vulnerable parts of armored ships. Projectiles are moreover more dangerous in proportion, as they strike the deck under a high angle, for then there is a greater chance that they will penetrate through to the machinery and the vital parts of the ship.

Finally, altitude contributes still further to increase the safety of sea-coast batteries by rendering them more mutually supporting. Several ironclads can open their broadsides at short range on a low battery in such a way as to concentrate their fire while escaping partially the fire of neighboring batteries, which can only act when the enemy's ships are at some distance out from shore. If, on the contrary, the battery is elevated, the ships cannot run in near to shore, and their ranges are about the same with respect to the battery they may be attacking as the ranges of adjacent supporting batteries are with respect to the ships, and these neighboring batteries can therefore act on almost as favorable conditions as the battery being attacked.

Practice firing out at sea shows that the splash of the shot can be more readily observed, and thus the fire better adjusted, when the battery is elevated above the level of the water; this is an additional advantage resulting from altitude.

Thus altitude increases the offensive power and the defensive strength of coast batteries to the point of assuring to them a material superiority over armored ships in a combat with them, while low batteries would be certainly destroyed. In cases where the natural relief of ground is not sufficient, the employment of armor-protection is the only way in which the inferiority of the shore battery to ironclads can be prevented.

As to the dead-angle zones resulting from the fact that the present 19 c.m. and 24 c.m. gun-carriages will not allow a greater depression from the horizontal than 5° we have shown that no serious disadvantage can result therefrom. They do not constitute a danger for the battery, and, in any case, the existence of the dead-angles will not warrant us in hesitating

to reap the advantages coming from an increase in the altitude of a battery. In certain particular cases, for example in fighting at points along the coast where a dead-angle cannot be avoided and where this zone is screened by natural features from the fire of neighboring batteries, it will be useful to have carriages permitting a larger angle of depression. But, in general, this is not the solution to be sought, for it requires so great an inclination of the superior slope that the covering mass would be dangerously weakened. The only way to fight directly within the dead-angle zone at ranges beyond 1000 m. to 2000 m., preserving the offensive and defensive advantages of altitude, is to be found in the employment of rifled mortars of large calibres, the adoption of is also further imposed by other considerations to be unfolded herein later on.

Bombarding batteries are, then, elevated batteries (if the topography permits), designed to fight at long ranges in order to protect the coast against the enterprises of the enemy. For them the duration of the combat will not be limited to a fleeting moment, as is the case with battering batteries; the struggle will sometimes last several hours. It will be carried on generally at such distances as will render it impossible to perforate the armor of the ships whatever be the calibres employed by the batteries, because, in the first place, the plates now carried on ships cannot be pierced, even by the most powerful pieces, except at short range, and, secondly, because the surface covered by the armor is very limited, and at long ranges the chances of hitting it are very small. The mean height of armor belt above the water is, indeed, only from 1.5 m. to 1.8 m.; it is true that the redoubt causes it to run up to 4 m. or 5 m. above the water line, but elsewhere its width is very limited, and, besides, the most recent armored ships have not the redoubt. On account of all these considerations it is admitted that battering fire will be employed but little beyond 2000 m. Thus for batteries of bombardment battering fire can be only the exception. The chance of hitting being much less than for battering fire, and the time at disposal not being so limited, the number of shots ought to be a much more important factor than the energy of impact. It is conceived, then, in a general way, that the armament of bombarding batteries ought to be composed, not like battering batteries of few pieces of large calibre, which by construction are not suited to a long-continued fire, but of a large number of pieces of smaller calibre susceptible of use in rapid and prolonged fire.

In order to arrive at precise conclusions as to the composition of the armament, it is necessary to study the structure of the armor-clad ships with which the batteries may have to engage in combat. We shall be assured thus of the possibility of hitting them, if not in their vital parts, at least where their guns are, (which are their *raison d'être*), in the unprotected parts of their hulls, or in their rigging, on which their manœuvring powers and their steadiness depend; in a word, to put them *hors de combat*. This study will furnish us at the same time certain facts by means of which we shall be able to fix approximately the nature and calibre of the pieces to be employed in bombarding batteries, as well as the manner of utilizing them in relation to the type of armor-clad.

LETTERS ON INFANTRY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Lieut. ODON GUROVITS, 11th U. S. Infantry.

X.

FLANKING MANŒUVRES AND FORMS OF ATTACK.

I NOW desire to discuss more fully some of the matters I referred to in my previous letter. In that letter I mentioned "the natural strong desire to lay particular stress on the results of attacks on the flanks." It is quite unnecessary to dwell upon the importance of pressure on the hostile flank, since every one knows that, owing to the effectiveness of modern fire-arms, the defensive, attacked only in front, will hold out as long as their ammunition lasts or until they are forced, owing to losses, to retire. Should one, however, succeed in gaining the enemy's flank, then the victory is assured.

The question, therefore, is, how to reach the flank ?

But two means are available, viz.: surprise or superiority in numbers.

We can make use of the former when we have roads leading both towards the flank and also towards the front of the defender (and I am inclined to call this the strategical mode of operating upon a flank), also by a skillful use of such cover as is offered by the accidents of ground or houses, woods, etc., which permit part of the available forces to throw themselves unobserved upon the flank of the enemy. *These two methods, however, cannot be practised on the drill ground.*

There is rarely a drill ground which would permit a practical trial of "the use of different roads," or "the use of cover"; moreover, the battalion is too small a unit to divide it according to strategical ideas. Therefore, the only illustration of flanking which can be practised on the drill ground is that arising from superiority of numbers. Here one must suppose the imaginary enemy to be inferior in numbers to our own battalion, and then extend our front until it overlaps that of the enemy. In such a case, when advancing to attack, that part which first comes upon the enemy is necessarily delayed on account of the skirmish; while the overlapping part of the forces will continue to advance by a wheeling movement, and, if the touch with the firing line remains unbroken, will naturally assume the offensive upon the hostile flank. But, owing to the limited space on the drill ground such an illustration will always appear unnatural because the force designated to attack the flank is, throughout the entire manœuvre, within the effective range of the supposed enemy.

Hence, I am of the opinion that every attempt to form an offensive flank, save that of overlapping the front of the enemy by change of front, should be banished from the drill ground. The strategical considerations,

such as the judicious employment of ground to effect surprise, etc., must necessarily be postponed for the field exercises and field manœuvres.

How can any one conceive a surprise on a drill ground? When such a supposition is made, its absurdity is at once apparent to the men.

The only opportunity to illustrate such a surprise is afforded at the time of the manœuvres where an enemy exists against whom to operate and who is actually surprised; then the effect of an operation upon the flank can be observed.

It is true, however, that our regulations direct that every possible form of attack be practised on the drill ground without regard to terrain.

Therefore, the only possible way to comply with these regulations is for the battalion commander to explain to his battalion what he intends the ground to represent, should he desire to send a company to execute an attack upon the flank of an indicated or fictitious enemy—but it will always appear unnatural.

I also referred to the manner and form of attack upon a position (such as a village, wood, intrenchment, etc.) without cover and exposed to the fire of improved arms.

Furthermore, I stated that this question was a prominent one after the last war, and has since been discussed in essays and experimented in on the drill ground. All the propositions made, however, have met with more opposition than support, and no definite conclusions have been arrived at. Still it is a question that all of us should interest ourselves in because of the enormous losses that the Corps of the Guard sustained while advancing to the attack over open ground at St. Privat. The regulations do not give positive directions about it, but simply say in a general way (par. 127, page 190) to endeavor to lessen the effect of the hostile fire at a halt and also when moving; and recommend when exposed to the fire of shell or case shot, to adopt formations of least depth and, when exposed to shrapnel fire and especially to rifle fire, to lie down and to adopt formations in smaller columns with least possible front. Thus, ample latitude is allowed us by the regulations for experimenting upon the methods already made use of in war and also upon the various propositions since suggested by individuals.

There is good reason to observe that a position such as a village, wood, etc., is not to be attacked at all in front when the ground leading to it is level or such as to offer no cover of any kind. In such a case the attacks must hold the attention of the enemy by artillery fire while the infantry operates on the flanks or attacks where the ground is such as to permit an approach or by outflanking.

This is very well, provided there is a choice. Such, however, is not always the case. There are cases where infantry, its right and left resting on other bodies that have favorable ground, must advance to the attack over level ground. Should then such infantry say, when the order is received to advance, "*I cannot, therefore, I will not obey!*"

For it, then, the question at once arises, how to advance and at the same time decrease the effect of the hostile fire? The regulations do not prescribe how, especially, should the plain in question be exposed to shell, case, shrapnel and infantry fire all at the same time.

We must then fall back upon our war experience, should we desire to form a definite idea of how to proceed in such cases.

In the battle of St. Privat the Infantry of the Guard left its cover, the fold running from north to south, situated west of Ste. Marie, in order to attack the position.

Before it succeeded in forming battalion columns it experienced an intense infantry fire at a distance from the enemy which, up to then, was considered as secure from infantry.

The infantry continued to advance, but the enormous losses, constantly increasing, loosened the columns and units of command. After the intensity of the hostile fire brought the advance movement to a halt, the most advanced troops of the attack becoming swarms, at about 500 to 600 paces from the long inclosing walls, lay down and returned the fire. The most advanced infantry lines of the 12th Corps, prolonged on the left the firing line of the Infantry of the Guard. Part of the infantry of the defenders had been in advance of the main position on the bare slope which, as soon as attacked, retired to a position farther up, and was finally driven from the highest brow between St. Privat and Amanvilliers. While part of the attacking artillery established itself there, the remaining batteries closed in on the fighting infantry and supported it with a fire *en masse*, not one of the shells missing its mark owing to the short range. As soon as the left wing of the 12th Corps advanced upon St. Privat from the direction of Roncourt, the attack formed almost in half a circle about the village. One of our infantry generals who directed the fire of the first skirmish line (upon noticing that the fire of the defenders ceased entirely from the crenellated walls which surrounded the gardens around the village) turning to his adjutants, said: "Now at it, otherwise we never shall get the village." He wheeled about to transmit the necessary orders, when the entire first skirmish line, inspired by the same thought, jumped up and with a great hurrah ran into the village, as if obeying an order transmitted by electricity.

This last run brought but few losses, as it appeared that the defenders had retired into the village. A long hand-to-hand combat took place as soon as the houses were reached, and it was probably with the reserve forces of the village who advanced to replace the line which had fled from the walls. As far as I could observe from my position with the artillery line to the right of St. Privat, this is a correct statement of the case.

Moreover, on the morning after the fight, which lasted until night, I found many of our infantry which came from Ste. Marie, towards St. Privat, dead and wounded, scattered over the entire field. These traces became denser and denser until they almost made a continuous line in the form of a halfcircle around St. Privat, some 500 or 600 paces from it.

In the near vicinity of the village but few had fallen. Some of our comrades drew the conclusion that the French rifle carried too high and that our men also, when near the enemy, fired high. However, we must seek another cause. Our infantry simply had the greatest losses at the distance from the village where it remained fixed the longest time, returning the enemy's fire. Then it took advantage of the right moment, that pause

where the hostile fire was almost entirely interrupted, to make the final rush.

I have previously called attention to a case at the battle of Sedan which tended to prove how invincible infantry is when attacked in front, provided it has ammunition and remains calm and unbroken. Therefore one must endeavor to shake it, no matter how, by a pressure upon its flank or by fire before entering its effective range of fire. We acted according to these principles when attacking in the battle of Sedan.

The very same Infantry of the Guard (although different battalions from those that began the attack on St. Privat) took the Bois de la Garrenne fourteen days later at Sedan. I stood east of Givonne with the ninety pieces of artillery of the guard which extended from the edge of the valley towards Daigny. The hostile artillery fire had been silenced entirely and General von Pape intended to take the Bois de la Garrenne. He spoke to me of it and directed me to shell the wood with my artillery for a certain period, and remarked that he would, at a specified hour (we compared our time for the purpose), advance from Givonne to attack, at which moment I should cease fire because of the position of his infantry.

Everything was executed as directed. After my ninety pieces had poured a deadly fire into the woods at short range (the distances varied between 1200 and 1600 paces) the Infantry of the Guard (rifles of Guard and fusiliers) climbed the heights and gained the *lisière* of the wood.

Over 10,000 prisoners (not wounded) were brought in by these troops. On this occasion the Infantry and Rifles of the Guard lost but 12 officers and 286 men during the entire battle of Sedan; only a small fraction of this loss, however, occurred when attacking the wood, because the same troops had previously taken Givonne and also had some casualties while fighting in the interior of the wood.

In the battle of St. Privat the Infantry of the Guard lost 8000 men. But the fight for the Bois de la Garrenne cannot justly be compared with the attack upon St. Privat, because the former could be approached unobserved by following the deep valley of Givonne up to a few hundred paces, while the only approach to St. Privat was a bare glacis almost one-quarter mile* distance.

The storming of Le Bourget, August 30, 1870, which I witnessed, might more properly be compared with the attack on St. Privat. The left wing column, the Alexander Regiment and Rifles of the Guard, with two batteries, advanced from Le Blanc Mesnil against the village. The artillery prepared the attack, finally taking position close to the village. The artillery and infantry fire drove the defenders from the outskirts of the village, which was reached by the skirmish swarms with very small loss, especially from the south. Losses began to occur, however, as soon as street fighting started. Specially instructive (with regard to attack formation) was the attack that was executed by the right wing from Dugny towards Le Blanc Mesnil, because infantry attacked without having the support of artillery. There was a fire upon the flank delivered by the horse artillery stationed north of Pont Thlon, upon the west brow, but on account of too great a range, it could not have had much effect.

* German mile.

There were two battalions of the Franz Regiment that had to advance almost 2000 paces over an open field. The leader, however, had previously practised the form of attack adopted on this occasion. In accordance with his drills the entire first line, consisting of two companies, was divided into two wings. The wings then advanced alternately across the plain in runs of 300 paces each, at the same time separating themselves into dense swarms. After each run the wing flapped down on the ground and caught its breath, finding cover in the potato vines, the other wing meanwhile running. As soon as the range of the needle-gun permitted, the wing on the ground poured a heavy fire on the outskirts of the village. Even now while I note this episode I hear the echo of the cheers of us critics from our position upon observing this well-considered and well-executed attack. The best part of it, however, was that the troops had scarcely any casualties until the village had been entered; so I have been assured by their leader. Still there were many losses during the hand-to-hand combat in the houses.

I can readily imagine the embarrassment that such an unusual mode of attack would produce along the French skirmish line. As soon as you observe the first advancing swarms, you naturally fire at them. But suddenly they disappear from view in the potato vines. The smoke of the defenders' fire, delivered from behind walls and fences naturally obscures the view, and it is a question whether they observe another line running or not. The line of defense is not straight but follows the outlines of the village, therefore, it is impracticable to cause all skirmishers to change sights and their aim at the new enemy. Should one, however, succeed in this attempt, it is quite probable that the required distance would have been run by the second wing, and it in its turn out of view in the potato field, while the first wing again rises and runs unobserved on account of the smoke and so, finally, both wings have gained a point within the effective range of the needle-gun. At this stage the resting wing showers the defenders' position with a storm of projectiles while the remaining one can complete its run with but trifling loss, the defenders' fire being directed upon the resting wing to silence their fire.

It is but human to believe that the defenders, surprised and suddenly overrun by the enemy in their immediate vicinity, yielded their position as a consequence and retired. One might claim that the troops of the defenders on that day may have been very inferior, being made up of marine infantry, old infantry, garde mobile, and Franc tireurs de la presse. But these very troops fought extremely well in the combat in and around the houses of the village; still I never learned what troops defended the outskirts of the village. As to the formation of the attacking body I must add that the skirmish line was followed by two other lines (the second again subdivided into two lines) which marched in a quiet, steady gait behind the centre of the first line of skirmishers, but with intervals between files so as not to offer a too compact target for stray bullets.

Although the attack upon Le Bourget on this side succeeded without any apparent assistance from the artillery, yet you will agree with me that an attack upon a similar position has but little hope of success when approached from its front only, the ground at the same time affording no cover.

In connection with this I now recall an attack upon a village which was conducted according to the ideal manner. We find it briefly mentioned in the efficient work of the General Staff, part II., p. 668. The annual books for Army and Navy give a detailed account of the particulars of that attack in the March number, 1872. According to that account, in the battle of Beaugency, December 10, 1870, General von Treskow, not desiring the enemy to continue the occupation of Villejouan, which threatened his right flank, directed an intense artillery fire upon it. Two batteries were specially directed against the village and they shelled it for two hours. It was observed that the enemy retired into the interior of the village to avoid the effect of this fire. Our infantry (76th fusiliers) had instructions to approach the village without masking our artillery. They gained a position within 200 paces from the village before being fired upon. They then rushed with a hurrah into the village.

Those of the defenders that remained at their posts in the outskirts were easily overpowered, but the greatest part must have fled, because the entire battalion lost but four officers and eighty-eight men, although fighting in the village proper lasted from noon till evening. The surprise of the enemy rendered comparatively easy the victory that followed. The battalion was formed in two lines. In the first line were the 10th and 11th companies, each throwing two platoons to the front as skirmishers; the 9th and 12th were in the second line. The latter followed as half battalion in the centre behind the first line; as soon as the first line pushed into the village on the east side the second line was directed to the north side whence it entered. We shall always have to proceed similarly in the future, notwithstanding our present weapon has a much greater range.

In the future we shall also be able to unite our fire with that of the artillery should the defenders not be sufficiently shaken by the latter fire alone; therefore we shall reach our objective with much greater security. If the enemy is once driven from his position on the outskirts of the village then any formation can be adopted by the infantry in approaching. But if the artillery fire is not sufficient to destroy or drive the enemy from his positions in the outskirts then the success of the Franz Regiment teaches us in what formation infantry has to advance to the point where it commences to return fire, viz.: in dense skirmish swarms.

The support will do best to adopt a line formation, and there is nothing in the regulations prohibiting them from leaving an interval of the width of a man between files to lessen the effect of stray bullets. The second line can follow in line or close column until necessarily drawn into the fight—all this I propose for cases where the ground is bare and consequently offers no cover or shelter of any character. When even the least cover presents itself the respective bodies must adopt that formation which would permit of the best use of such cover. * * *

MOUNTAIN ARTILLERY IN EUROPEAN ARMIES.

Translated from the French of CAPTAIN BORDENHORST,

By LIEUT. C. D. PARKHURST, FOURTH ARTILLERY.

INTRODUCTION.

MOUNTAIN artillery has not a past as ancient as that of field artillery; but it dates back quite far.

Thus already in the 15th century there were cast at Perpignan some pieces of ordnance composed of two parts, and intended to be transported through the narrow defiles of the mountains. These guns were jointed, and carried by pack animals. The small guns and cannon of the 16th century were most often employed in mountain warfare.

Neither mountain nor field artillery possessed at this time a special organization.

It was not until the 18th century, during the War of the Spanish Succession, that the French caused some one pounder guns about 1m. 70 long, and weighing 50 kil. to be constructed. These guns, the carriages and a supply of 12 rounds could be very easily transported by a single mule.

These pieces of ordnance were replaced at first by 4 pdrs., having a length a little more than 1m. and weighing 75 kil.

Later the length was reduced to eight calibres. They were mounted on carriages of forged iron and were intended to be used exclusively as mountain guns.

In 1757, the Marshal of Saxony had made for mountain warfare a piece having a length of 21 calibres and weighing nearly 110 kil. Its projectile weighed a kilogramme. This piece of ordnance, after undergoing some modifications, was advantageously employed by the Portuguese in 1760, during the Spanish War. But yet, at this time, no one thought of giving to mountain artillery a special organization.

Gribeauval himself, the reformer of the French artillery, did not attach any particular importance to it. It was only toward the end of the last century, during the war in Upper Italy that a division of artillery was formed, intended to operate exclusively in mountainous countries. Its material was composed of several 3 pdr. pieces of ordnance, captured from the Piedmontese in 1792. These guns were very light, had a conical chamber to receive the charge, and rested on a flask carriage. These last were replaced later on by a carriage made in one piece, with a trail in the form of a trough. This was intended to receive stones and earth to give a certain preponderance to the rear part of the carriage, and thus to diminish the recoil of the piece.

The charge being quite large, the range of these guns was all sufficient; but the carriage had the inconvenience of upsetting. Later a heavier carriage was adopted which was less durable, and from which it was necessary

to dismount the piece and wheels, and to transport them separately on the mule's back.

The greater part of the guns of which we have just spoken were recast in 1803, and served for the construction of other 3 pdrs., weighing about 80 kil. and mounted on carriages weighing 50 kil. (The weight of the piece and that of the carriages of the Piedmontese being respectively 75 and 80 kil.). In spite of the good results obtained with these guns, considering their solidity, it is certain that their calibre was too small, and that the firing of case-shot was inadequate; these were the considerations which led successively to the construction of guns of 4, 8 and 12 pounds. But these latter pieces had to be abandoned because of the great number of pack animals necessary for their transport. It was the same with the 6 inch howitzers and the 8 inch mortars which had been the subject of numerous experiments. They had about the same weight as the 4 pdr. guns and rested upon jointed flask carriages. New efforts were made to overcome the inconvenience of which we have just spoken, and resulted in the introduction of 3 and 6 pdr. guns and of $5\frac{1}{2}$ inch mortars.

The French possessed then a special mountain artillery, but all of its elements could not be utilized everywhere with the same advantage; and the cost of maintenance was far greater in proportion than the useful effect that it could produce.

The employment of an independent mountain artillery appears to have been introduced in Austria a little later. Colonel Wachtendouk, who commanded the Austrian Expedition in Corsica, had made at Genoa some guns of a new class called "falcounets." The guns of the imperial army could not be used in the mountains of that island.

During the Seven Years' War, an Austrian general, who had the campaign in the "Giant Mountains," ordered the frontier regiments of Croatia and Slavonia to be accompanied thenceforth by the small guns (field pieces) with which he had armed their frontier forts and boats, whereas the ordinary falcounets and the regimental pieces (6 and 3 pdrs.) were often left in rear. It appears, however, that these dispositions were only temporary, and did not end in the formation of a corps of mountain artillery. There was no further question of it in 1753, when Prince Wenzel Liechtenstein, director-general of artillery of that time, caused the rearrangement of that arm with field, siege and fortification artillery.

The regulations of field artillery, published in 1757, make no mention of mountain artillery, and it appears that the events near the end of the last century, that is to say the war against the French Republic, are what contributed the most to give it a separate organization.

At this time light bronze guns—1 and 3 pdrs.—were introduced, which differed only from those used upon the gunboats of the Danube by the knob of the cascable being solid instead of being pierced. These guns were respectively 16 and $11\frac{3}{16}$ calibres in length and rested upon light wooden flask carriages, from which the axles and wheels could be dismounted.

The first precise information concerning mountain artillery of this epoch appears in the instructions upon the transportation of war material for the War of Italy in 1794.

We here find the following table, which gives the supply for the mountain guns :

Designation of the Ammunition.	1 pdr. gun.			3 pdr. gun.		
	Upon pack animals.	Upon reserve carriages.	Total.	Upon pack animals.	Upon reserve carriages.	Total.
Solid shot.....	168	72	240	120	80	200
Case-shot.....	24	24	48	24	24	48
Packages of quick match..	23	11	34	18	12	30
Candles....	50	25	75	50	25	75
Coils of match.....	1	2	3	1	2	3

We also find further indications in the following orders, given on the occasion of the Tyrolean War in 1798.

Manner of transportation and weight of charge for 1 pdr. gun for the Tyrolean War in 1798.

If two pieces are united :

1 mule carries 2 guns.....	175 kil.
1 mule carries 2 carriages.....	84 kil.
1 mule carries 4 wheels and 2 axles.....	120 kil.
5 mules carry each 2 cases filled with solid shot.....	80 kil.
1 mule carries 2 cases containing grape shot.....	100 kil.

The service of the piece requires the presence of two cannoneers, and four auxiliaries. One mule carries—in addition—the baggage inclosed in two cord nets. Trenching material is carried in cases formed of lathes. The chests are placed in square clasps, or in stirrups attached to the pack-saddle, the whole covered by a glazed canvas.

The organization of mountain artillery appears to have been abandoned in Austria from the time when the war with France was ended, the material being put away awaiting some future use.

None of the writers upon the artillery of this epoch make mention of the organization of mountain artillery.

A short time after a new war engine was introduced in the artillery—war rockets.

Known for a long time by Oriental people, they were not employed by the English until seen in 1780, in the wars in the Indies.

The Englishman—Congreve—whose name is closely connected with the introduction of the war rocket, sought to solve the question, and made—in 1804—some experiments with such happy results that his countrymen made use of this new engine with a considerable success in 1806 at Boulogne, and in 1808 at the siege of Copenhagen.

The rockets were at first only employed as fire-projectiles, intended to set inflammable objects on fire. But an officer of the Danish artillery (Schuhmacher) conceived the idea of placing a hollow projectile at the front end of the rocket, and to throw them against the enemy. Congreve, in 1814 replaced the hollow projectile by the shrapnel, and the English thus made use of them at the battle of Waterloo.

The use of rockets was not introduced into Austria until 1808, and the first experiments were made close to Vienna on the 24th of March, by the high commission of the Artificers of the Corps of Bombardiers, with incendiary rockets made after Congreve's model. War breaking out, the experiments were abandoned; they were not resumed until 1815, under the direction of Major Augustine, who received the order to establish a rocket factory at Wöllersdorf. Already in August of the same year, Major Augustin reported with two rocket batteries to Huningue, but too late to prove of service.

The favorable results that these experiments had furnished in Austria contributed greatly to throw discredit upon mountain artillery. This new war arm had elsewhere given brilliant results in 1839, in the struggle against the Montenegrins.

In 1829 it was ordered in France that the mountain artillery should only have one calibre of howitzers for the future. This measure was soon imitated by the artillery of nearly all the Powers.

The piece—of bronze—was of 12 pdr. calibre, and had a length of 7 calibres, and an approximate weight of 100 kil. The shell weighed 4 kil. The carriage was of wood and was made in one piece—also the axle. The wheels were made with spokes, and had a diameter of om.95; the track of the wheels was om.74; the pointing apparatus lighter, and the braking apparatus consisted of a simple cord. Finally a cart or carriage with shafts was attached to the end of the gun carriage.

Seven mules sufficed for the transportation of this gun. One carried the gun, a second the carriage and the five others the ammunition chests.

The French mountain howitzer had met with success in the combats of Algeria, and it can well be said that the complete submission of this country would not have been so easily accomplished had not Marshal Bugeaud had mountain artillery at his disposition.

In 1823 and in 1839, Austria caused modifications to be made in her mountain guns, and in 1844, she adopted the same as France—the 12 pdr. howitzer as the only mountain gun.

The guns were of bronze and weighed 104 kil. It proved to be easily lifted by two men with the aid of short hand-spikes, and could be carried by hand to quite a distance.

The flask carriage weighed 112 kil. and resembled in its construction the carriages of the field artillery. It had a wooden axle, and spoked wheels having a diameter of 95 centime. The track of the wheels was also 95 centime, and the gun carriage had a cart or carriage with shafts and braking cords.

The ammunition was in charges of 12 and 16 half ounces, light or hollow balls, spherical case (?)—(*boîter à balles creuses*) and hunting case (*shrapnel*)? (*boîtes de chasse*). Their range reached 1300 paces.

The transportation of the 12 pdr. howitzer required the service of nine mules—one for the gun, one for the carriage, and five for the ammunition chests, two to each mule, in all 80 rounds. Two mules carried the baggage—one that of the men and the implements, the other that of the two officers.

The English had, from the organization of their mountain artillery up to 1860, 1 and 3 pdr. bronze guns and howitzers of the same metal of 4½ inches, as

mountain guns. The 1 pdr. gun, the 3 pdr. mountain gun, and that of the same calibre, before being made use of in the Colonies, had a length respectively of 30, a little more than 12 and 16 calibres. The diameter of the chamber of the howitzer was the same as that of the 12 pdr. field guns. The length of the howitzer was close on to 4 calibres. The weight respectively of these pieces was about 100, 75, 105 and 160 kil. The carriage was of wood and could be hauled by the assistance of a cart with shafts, or transported in parts, after having been dismounted. The axles were of wood. The mountain batteries and those of the Colonies were composed of three guns and one howitzer. For each 1 pdr. Colonial battery gun there was a caisson. This number was doubled for each 3 pdr. gun of the preceding batteries, and for each howitzer belonging to mountain or Colonial batteries. These carriages were transported (hailed) by the aid of horses.

The Russian mounted artillery was formed up to 1838 of 3 pdr. guns and 6 pdr. mortars. Advantage was taken of the new armament of the field artillery to replace them in the same year by pieces of ordnance of the same kind in bronze.

The 3 pdr. guns rested upon wooden carriages the same as those of the field guns; but with converging flasks. There was no axle body, and the axle was of iron. The wheels were of wood with spokes. Their diameter 87 and their track 79 centine.

At the same time a kind of fire carriage or limber, composed of a cart with shafts and a cushion or bolster intended to receive a chest, and capable of being adapted to the gun carriage by means of a bolt, was introduced.

About the middle of this century there were constructed, for the Caucasian war, some mountain gun carriages of iron, presenting at the same time the characteristics of the flask carriage. They were formed of two parallel flasks bound together by 6 bolts in the form of cross-bars and forged in one piece.

The mortar carriages were flasks also, but without wheels. The two cross-bars that served to bind the flasks together, served also as bolsters, and allowed angles of elevation of 30° and 45° to be given to the mortar.

A mountain battery was composed of 12 3 pdrs. or of 4 mortars.

But soon the introduction of rifled guns, the precision of fire and the great range of the infantry arm, caused the inferiority of the existing mountain artillery to be recognized and caused rifled guns to be adopted.

Austria appears to have taken the first step in this direction. In fact, during the campaign of 1859, she sent as an experiment in the south of Dalmatia, two batteries of 3 pdr. rifled guns, constructed after the system of Lorinz. The 3 pdr. gun-cotton field guns and the mountain guns of the same calibre were introduced in 1862 and 1863 respectively.

At the same time there were adopted in France the 4 pdr. rifled mountain gun; in Italy the 5½ pdr., in Switzerland the 4 pdr., and in Russia the 4 pdr. muzzle loader, and soon after the 3 pdr. breech loader.

The question of rockets was raised anew about 1860 owing to the introduction of the Hall rotating rocket. This inventor was enabled to give them a direct and at the same time a rotary motion by the reaction of the

gas giving to the axis of the rocket the necessary stability and thus allowing the suppression of the stick.

The rotary rockets of Linpölsch were employed in Austria in 1866, but they no longer could contend with the new guns that had been sensibly improved. The use of rockets was then abandoned April 29, 1867, and it was decided that in the future mountain batteries should only be armed with 3 pdr. guns.

There were yet formed, however, in 1869, two rocket batteries to support the operations in the south of Dalmatia. These batteries rendered great service.

But the experience of the Franco-Prussian War, which produced a complete revolution in the armament of the field artillery in the greater part of the European States, also caused a new armament of the mountain artillery.

Spain set the example by introducing into her artillery the mountain gun of 8 cm., m. 1874, Placentian System. Austria, Italy and Switzerland also by adopting respectively the mountain guns of steel bronze of 7 cm., of bronze of 7 cm., m. 1877, and of steel of 7 cm., 5m. 1877. Turkey and Greece gave the preference to mountain guns of forged steel of the Krupp system.

The improvement and extension of the means of communication in the high mountains permitted the use of traction up to the principal high lines and gave to Austria the idea of using—in mountain warfare—the greater calibred field guns with carriages to correspond. After some conclusive experiments this country adopted in 1879 field batteries of 9 cm. with narrow-gauge track.

These batteries possess the same guns and the same ammunition as the heavier field batteries; but the track of the wheels of the gun-carriage and of the fire-carriage, or limber, is narrower. In the first place the axle boxes are suppressed, and secondly the chests have smaller dimensions. For the caissons the wheel track is also narrower, and the chest smaller.

Again, the employment of jointed guns during the Turco-Russian War gave a new impulse to the perfecting of mountain artillery, and we go back to the ideas which prevailed in the fifteenth century. England has first set the example in adopting jointed mountain guns of the Armstrong system, guns which have also been made the subject of experiments in Spain. The two English batteries which were employed in Afghanistan behaved perfectly. The employment of these jointed or dismountable guns, which permits, by the division of the load upon two pack animals, the lengthening of the gun and increase of its calibre, leads naturally to the construction of jointed or dismountable carriages; and advantage can thus be taken of the independence of weight to give them greater stability.

The first practical realization of this idea was had in France by the introduction of new jointed carriages for mountain guns of 80 mm. Experiments with jointed guns and carriages are equally being made in Russia. Here also a mountain mortar is being experimented with, whose plunging fire will have a very great importance in mountain warfare.

In conclusion, we believe that the employment of jointed guns and carriages, the power to use the greater field calibres and plunging fire con-

stitute the greatest progress that can actually be given to mountain artillery.

We give further on the detailed description of the mountain artillery as it now exists in the principal European armies.

IST. MOUNTAIN ARTILLERY OF AUSTRIA.

At the same time that new field material was introduced in the Austrian artillery, a new mountain gun was also adopted, "the mountain gun of 7 cm., breech-loader, m. 1875," in place of the muzzle-loading gun, m. 1873.

A. The Gun.—The gun of 7cm. is in steel-bronze, and its formature mechanism is a flat quoin. Exteriorly it is composed of the chase, the middle part and the breech.

The chase has a conical form and is terminated by a swell at the muzzle. It is joined to the middle part by a rounded surface. Upon the swell of the muzzle is the mass of the front-sight, which presents a hollowed-out place, tapped to receive the guide for the sight, whose head and extremity are blackened.

The middle part has also a conical form, and carries near its front part the trunnions, relieved from the body of the gun by cylindrical rim bases. Upon the right rim base a hollow place is made with two gaps, to receive a sight, also blackened, which is slipped into the hollow place, and is fixed by two screws.

The breech is joined to the middle piece in a manner sufficiently apparent; it is formed to receive the breech-mechanism, its form is cylindrical, and it is terminated in rear by a plane surface.

The breech mechanism, consisting of a block or quoin, with its loading aperture, and its formature gas-check, etc., etc., slides to and fro in a seat in the breech perpendicular to the axis of the gun. This breech-block has a winch handle, a turn of which unlocks the block, and allows it to be withdrawn to the loading position. Suitable safety screws are provided to hold the block absolutely secure while firing, or to keep everything in place while on the march.

The vent is inserted in the top of the gun in front of the breech-block.

B. The Carriage.—The Austrian mountain carriage is a flask carriage of plate iron, with steel axle. The wheels are of wood, and the hub of bronze.

The carriage has two flasks.

The flasks of plate iron are strengthened by angle plates, knees, the plates forming the trunnion beds and the axle seat.

The wheels have a hub of bronze, ten spokes, and five felloes. The ends of the spokes touch each other and completely fill the space between the two axles. They are bound between them by bolts which traverse the spokes.

This carriage is generally carried on mule-back, but if the roads are good, it is capable of being hauled by the aid of shafts.

These shafts are made with two wooden arms, each terminated at one end by a ring to hook onto the traces and at the other by a clasp to fix the shaft to the carriage.

The weight of the gun-carriage complete, carried by one mule, is 109.39 kil.

C. Ammunition.—The ammunition consists of shell, shrapnel, case shot, heavy and light charges, and friction-primers.

The shell complete weighs 2kg.882. The fragments number 62.

The shrapnel, adjusted, weighs 3.192 kil. The explosive charge is 39 gr. The bullets, are alloy of lead and antimony, one 65 in number. The explosive of the shrapnel furnishes 73 effective fragments and bullets.

The case-shot consists of a cylindrical case of laminated zinc; they are 48 in number, and weigh each 43.64 gr. The interstices are filled with sulphur.

The heavy charges are 35 gr. of ordinary artillery powder. The light charges only 16 gr.

The shell-range extends up to 4000 paces; however, from 2000 the execution is good only against extended objects. If these objects present a certain degree of resistance shell is not fired except at distances under 1000 paces. However, this fire is yet employed against troops under shelter, even at more than 2000 paces.

The plunging shell fire gives execution at distances comprised between 500 and 2000 paces; but it is preferable to make use of it at distances from 1200 to 2000 paces in order to have a sufficient curvature of trajectory.

The efficacy of shrapnel regulated beforehand extends from 450 to 700 paces. These projectiles burst in half at 375 paces in front of the guns. From 600 paces the shrapnel, regulated at the moment of firing, give better results than those regulated in advance. The efficacy of the first extends up to 2500 paces. However, as from 2000 paces the observation and the determination of the position of bursting becomes difficult, it is best not to exceed that limit except occasionally.

If the mark is covered, shrapnel fire is not used except at distances over 1000 paces, in order to obtain satisfactory effects in rear of the cover.

The efficacy of case-shot extends up to 500 paces if the ground is even and hard.

(To be continued.)

MODERN MILITARY RIFLES AND HOW TO USE THEM.

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IN attempting to deal with the subject of this lecture it will be necessary for me to dwell lightly on the various types of modern small arms, the nature of the ammunition, and the changes in tactics and fire tactics which may be expected, consequent on their introduction, and, finally on musketry of the past, present, and future. At the present moment the modern military rifle all over Europe is a magazine arm of small calibre, varying in different countries between 0.298 inch and 0.315 inch.

In these days of gigantic standing armies on the Continent and organized trained reserves, which may be reckoned by millions, any radical change in the infantry arm would be so costly that the present description of rifle will probably remain unchanged for many years to come.

Every nation in Europe has taken advantage of the armed peace which has prevailed since 1877 to re-arm and prepare for the coming struggle, and in this country we have at last obtained an infantry weapon, which, in all the essential qualifications of a military fire-arm, is equal if not superior to any at present in use on the Continent.

The trials which took place in 1888 in India, Egypt, Nova Scotia, and the United Kingdom, were most satisfactory, and more recent experience only tends to confirm the belief that the British Magazine rifle will compare favorably with any other military rifle.

It would take too long to give in full detail all the technical differences which exist in the small arms of different countries, suffice it to say that every European Power is rapidly arming with the same type of rifle, having practically the same range and rapidity of fire, but varying somewhat as regards the calibre, description of rifling, the breech action, and position and shape of the magazine, together with its nature and the number of cartridges contained in it.

The following are the main features in the service rifles of different countries, but the weights are approximate only :

	Rifle.	Weight.		Calibre.	Magazine.	Rounds.
		lbs.	oz.			
America	Lee	9	0	0.450	detachable	5
Austria	Mänlicher	10	2	0.315	fixed	5
Belgium	Mauser	8	2	0.310	"	5
China	Lee			0.433	detachable	5
Denmark	Not settled					
France	Lebel	9	4	0.315	tube	8
Germany	Mauser	8	9	0.310	"	5
Italy	Vetterli	10	10	0.409	"	5

	Rifle.	Weight. lbs. oz.		Calibre.	Magazine.	Rounds.
Japan	Murata					
Norway and Sweden	Not settled	9	2	0.315	tube	8
Portugal	Kropatchek					
Russia	Rearming					
Spain	Not settled					
Switzerland	Vetterli	10	10	0.409	tube	5
Turkey	Mauser			0.433	"	8
England	Lee-Metford	9	9	0.303	semi-detachable	8

The infantry fire-arm of 1890 differs from that of 1880 in many respects, the chief points being the reduction of calibre and the introduction of a magazine.

Reduction of calibre allows of the soldier carrying a larger number of rounds on his person without increasing the weight. This alone is a very substantial gain, and it seems probable that the difficult question of how to supply ammunition in the field has been practically solved by the introduction of the small bore rifle.

As regards the magazine, the various types have practically dwindled down to two, viz., a steel box under the action, just in front of the trigger-guard, either fixed or detachable, and a tube under the barrel. The type most in favor, in fact almost universal, is the fixed steel box; America, France, and England are exceptions. The majority of those countries which have the fixed magazine under the action make use of thin steel or tin fillers or clips, to hold together the number of cartridges which the magazine will contain, usually five. This filler, with the cartridges, is either inserted bodily into the magazine, as in the Austrian Mänlicher, and drops out through a slot in the magazine when the last cartridge is fired, or else the filler is used, wherewith to push the cartridges down into the magazine, and is then thrown away or replaced into the pouch. There are many advantages in this latter method of charging the magazine, theoretically it is the perfection of a magazine system, as the magazine can be filled in one motion, the contents expended, if necessary, in rapid fire, and again refilled in one motion, or else one or more cartridges only having been fired, the soldier can fill up his magazine out of his loose rounds, one cartridge at a time. It is worthy of consideration whether this system should not be applied to our own rifle.

The Austrians have boldly faced the introduction of the magazine system, and always load through the magazine, in fact, it is laid down in their regulations "that although the rifle can be used as a single loader, yet it is against the principle of the arm."

The French in their new Lebel rifle have deliberately adhered to the tube form of magazine under the barrel, the same as they had in the Kropatchek rifle. A long spiral spring is compressed at the muzzle end by each cartridge in succession pushing the one in front of it up the tube. There are obvious objections to this form of magazine. It is complicated; would be difficult to repair on service; is by no means easy to fill quickly; and the balance of the arm is altered with every round fired from the magazine.

The magazine on our rifle is a compromise between a fixed and detachable steel box, and it possesses the advantages which are common to all detachable magazines, viz.: that if one gets damaged on service it can easily be replaced, and that troops defending a position can be readily supplied with any number of magazines full of cartridges, to place alongside them, ready for use.

The introduction of the small bore into European armies has necessitated a radical change in the ammunition. To discover the most suitable explosive and bullet has long been a stumbling block, and even at this advanced stage, when the rifle is practically settled, it is by no means certain that such is the case with the ammunition.

Preliminary trials with the new military rifles were carried out in every country with black powder, and the change of weapon was decided upon by the results obtained with it. The principal objections to black powder are dense smoke, fouling, want of uniformity, and the impossibility of obtaining a higher muzzle velocity than 1850 or 1900 f. s. without the pressure on the chamber mounting up to an inconvenient if not dangerous extent.

On the other hand its advantages are dense smoke, stability and fouling. It may seem a paradox to claim for dense smoke and fouling that they are positive advantages, and in the same breath to assert that they are disadvantages. A little reflection will show that under certain circumstances smoke may be very desirable, such for instance, as moving reserves to a flank or pushing up fresh troops under its cover, unobserved by the enemy, whilst to troops defending a position who want a clear front, it would be a positive disadvantage.

The heat generated by the explosion is so great in these small calibre barrels, that some sort of protecting buffer, between the bullet and the bore, to prevent stripping and metallic fouling, is absolutely necessary, and this is supplied by the fouling which black powder leaves behind.

On the other hand, in very hot dry climates the fouling caused by black powder would probably be excessive and a disadvantage.

It is needless further to discuss the merits or demerits of black powder, as it is doomed as an explosive for military rifles; and scientific chemists of every nation have turned their attention to what seems the somewhat difficult task of producing a smokeless explosive, which shall be suitable for the new arm under all circumstances and in every climate.

Every now and again we read a paragraph in the newspaper to the effect that such and such a Power has at last hit upon a smokeless powder for the new rifle, which is perfectly satisfactory. A short time afterwards we read that grave doubts after all are expressed as to the stability of the new powder or its safety, etc. The whole question of the ammunition for the new rifle is a very difficult one, not only as regards the powder but also the bullet.

Several smokeless and semi-smokeless powders, some of home, others of foreign manufacture, have been tried in this country for use in the new rifle with doubtful success.

The Duttenhofer, almost smokeless powder, made at Rothweil, in Ger-

many, gave satisfactory results as regards accuracy, velocity, and pressure on the chamber, but it was thought that it would not be sufficiently stable, and it was given up.

Nobel's smokeless powder, composed of nitro-glycerine, nitro-cotton and camphor, gave even better results than the Duttonhofer powder, but it was feared that the presence of so volatile an ingredient as camphor would assuredly set up some chemical change, and that this powder would not be reliable in all climates. The trials with this compound were not of a sufficiently exhaustive nature to permit of a definite decision being arrived at respecting the effect on the inside of the barrel. Some 300 rounds were fired at Enfield without any sign of metallic fouling. It has been stated that the volatility of camphor, the objectionable ingredient, can be held in suspension without in any way affecting the powder as an explosive. On this point I offer no opinion. It has also been stated that Mr. Nobel has given up camphor altogether.

Sir Frederic Abel's cordite or string powder, if such a term can be used, also gave excellent results as regards pressure and muzzle velocity (2200 f. s.), and the accuracy at 1000 yards, the rifle being fired from the machine rest, was nearly equal to that given by Nobel's powder, the mean deviation being a little more than one foot, but the excessive heat set up in the barrel and the extreme cleanness of the powder, the barrel being quite bright after each discharge, caused metallic fouling, and occasionally the covering of the bullet was stripped off and remained in the barrel, rendering the rifle unserviceable. There was also erosion.

It was seen that some change was necessary, either in the explosive or the bullet, to overcome these serious defects. Various descriptions of bullets, including one of solid copper, were tried; soft steel and wrought iron were tried as a covering for the bullet instead of nickel, but the result was not wholly satisfactory. Eventually, some substance was introduced into the explosive, and it is believed that the metallic fouling has been got over, but then the accuracy fell off. Granted that black powder is doomed, still it would be rash to predict the exact nature of the ammunition of the future. We, with our army, liable at any moment to a sudden call on service in any quarter of the globe, cannot take powder without careful and exhaustive trials, and we must be perfectly sure that it is perfectly safe and reliable, under all conditions and in any climate, before we commit ourselves to a large order. Failing such an assurance it would be better to put up with smoke and stick to black powder. The French, who have for years been making experiments with smokeless powder, are said to have lately made some change in the composition of their powder, and to be perfectly satisfied with the results obtained. It is also reported that a smokeless powder is now being manufactured in Austria, which is perfectly satisfactory.

An outcry has been made in some quarters as to the delay that has taken place in the issue of the new rifle and smokeless powder, and it has been thrown in the teeth of the Small Arms Committee that they provided a rifle without any ammunition. As regards the delay, such a total change in the arm and its ammunition could not be carried out without very prolonged trials, and the Small Arms Committee submitted the rifle after trials carried out with

Rubin-black powder pellet ammunition made at Thun. Since then the question of the ammunition has been handed over to the Explosive Committee, and the Small Arms Committee are in no way responsible for the performance of the rifle with a novel ammunition over which they have had no control. It is very much to be hoped that all the difficulties connected with the new ammunition have now been got over, and that an issue of smokeless powder will shortly be made.

In addition to the tactical advantages which will be conferred by the absence of smoke, especially to troops acting on the defensive, there are other advantages such as an extended fire or danger zone, and increased penetration, due to the great velocity given by the new powder.

As regards the increased danger zone, in other words the extent of ground within which a man would be struck using the fixed sight (*i. e.*) that for 300 yards. Many people have confused notions on the subject, and talk about the point blank range with the new powder being 500 yards at least. There is no such thing as point blank range in the ordinary sense of the term, and the increase of fire or danger zone which will be gained by the new smokeless powder is very much less than what is generally imagined. All the rifles now issued were sighted with Nobel's smokeless powder, having a muzzle velocity of 2250 f. s., in anticipation of the early issue of our own smokeless powder.

If aim be taken at a man's breast, using the 300 yards sight, he would be struck up to 450 yards with the ammunition now issued, and up to 490 yards with the new smokeless ammunition. It makes no difference whether the firer is standing, kneeling, or lying down.

It is a curious fact that at 300 yards, using the black powder pellet ammunition, the bullet instead of striking below the mark, as might naturally be expected, goes 1 foot high, and at 250 yards $1\frac{3}{4}$ feet high. This is entirely due to the flip or jump of the barrel at the moment the bullet leaves it. When the sight is fixed the sighting is more or less corrected, and the soldier, without having to alter his sight from 300 yards, would strike a man, aiming at his breast, anywhere between 450 and 50 yards. This is with black powder.

It has been urged as an objection to the magazine rifle, that the soldier would expend his ammunition too quickly. When the breech-loader was first introduced the same argument was used. The statistics of the expenditure of ammunition in modern campaigns tend to prove that although in some exceptional cases battalions and companies have fired away a large amount of ammunition, yet on the whole the expenditure has been well within the amount carried by the soldier. At the battle of Königgrätz, in 1866, the 1st Prussian army expended on an average, 12 rounds per man; on the other hand 3 battalions averaged 30 rounds per man, and some few companies as many as 80. At the battle of Rezonville, in August, 1870, the 2d Division of the French Imperial Guard, after a prolonged combat, expended 20 rounds per man. At the battles of Forbach, De Borny, St. Privat, and De Noisseville, the average number of cartridges expended per man in the French army was 30. On the other hand the French troops actually defending St. Privat expended all their ammunition (90 rounds), and the am-

munition carts not coming up, were forced to retire. In the Russo-Turkish War of 1877, the Russians carried from 80 to 100 rounds. General Skobelev, no mean authority, considered that 130 rounds were necessary to keep up a fight, once that troops were fully committed to it. Expenditure of ammunition is to a great extent a question of training and fire discipline; and as the soldier will be able with the new rifle to carry 98 rounds in his pouches, without counting the two extra packets which would be issued from the ammunition cart for his pockets, we may fairly conclude that the introduction of the magazine rifle should not be dreaded, on the grounds that there will be an undue expenditure of ammunition. One of Suvaroff's maxims was "Fire little but straight"; and Marshal Bugeaud used to say "A good infantry husband their ammunition."

As the new rifle is sighted up to 3500 yards with smokeless powder, it may be assumed that in the future, fire, under certain circumstances, will be opened at much greater ranges than has hitherto been customary. In "Infantry Drill, 1889," rifle fire from 1700 to 800 yards is classed as unaimed, and useful field artillery fire is limited to 3000 yards. Recent experiments with the new field gun and new rifle foreshadow aimed and effective fire at distances very much in excess of these. As far back as September, 1888, detachments of nine men from the 1st Devon, 1st Suffolk, 1st Sussex and 1st Battalion King's Royal Rifle Corps, made excellent practice at 2400 yards, and fair at 2800 yards, although the rifle was strange to the men, and they had no previous experience of such long range firing.

The number of hits at the three distances fired at was as follows :

Distance.	No. of hits.	Percentage of hits to rounds fired.	Object.
2000 yds.	181	48	} 4 Companies standing in ¼ column.
2400 "	109	29	
2800 "	104	19	

It has been said that extreme range fire is only a waste of ammunition, and has never yet checked the advance of an attacking force; at the same time there are many instances on record in modern campaigns of extreme range infantry fire, even when unaimed, proving very destructive. At Gravelotte and Mars-la-Tour the French inflicted severe losses on the Prussian guard at a very long range. During the Russo-Turkish campaign, in 1877, the Russian reserves suffered heavily from the extreme range fire of the Turks, although it was in every sense of the word unaimed. As regards the fire of modern field artillery, good practice is now made up to 5000 yards, and even beyond. At Okehampton last summer 146 hits were made at 5000 yards, on 90 dummy figures, representing a company in column of fours coming over a hill, the head of the column only being visible; time occupied in firing, 10 minutes. At 2500 yards, 5 shell fired at 70 dummies in a shelter trench struck 11 of the figures. At 4800 yards, a target 6 ft. by 6 ft., was struck once out of 10 rounds; and at 4900 yards the hits on a space of ground, 100 yards in depth and frontage, were 50 per cent. In all these cases the range was found as on service.

May we not conclude, that in future troops will have to deploy from

columns of route at a greater distance than is laid down in our regulations; also, that infantry fire, especially if picked men are employed, will be effective, and cause losses at distances hitherto undreamt of?

In order that full value may be got out of the new arm, great care will have to be taken in training officers, non-commissioned officers, and men to the intelligent use of the rifle under all the possible conditions of modern warfare.

We have no experience to guide us as to the effects of small bore magazine rifles and smokeless powder in war; but as every change in the infantry arm has hitherto brought about a change in tactics and fire tactics, it is only reasonable to conclude that these new steps in advance, made by military science, will necessitate some further changes.

We constantly hear people say: "We have had changes enough, let the army alone for a little while and give us time to recover our breath and look about. We did well enough before, why confuse officers and men by these newfangled ideas and constant changes?" Such sentiments are destructive of all progress and efficiency! An army that stands still in thought or deed is on the downward path, and instead of "Halt," its motto should be ever "Forward!"

Decisive results can only as a rule be obtained by a vigorous offensive, but an attack ill-planned, based on false principles and not carried out in accordance with the tactics required by the power of modern rifles, would nowadays in a European campaign mean total destruction. The attack on St. Privat during the Franco-German War, was a case in point where false tactics caused the Prussian guard in a few minutes to lose 300 officers and approximately 8000 men.

At Maiwand and at Isandhlwhana, more especially in the latter engagement, the defeat of our brave troops was brought about entirely by false tactics, the same may be said of Majuba Hill and the fight on the Ingogo. On the other hand, the tactics and fire tactics employed at Rorke's Drift and Ulundi, and during the campaigns in the Soudan, generally, were formulated with due regard to the numbers, tactics, discipline and weapons of the enemy, as compared with our own numbers and the powers of our weapon.

In the future, says a modern French military writer, "the troops that attempt to carry a strong position that is well held are marked out for destruction."

It is laid down in the new German Field Exercise "that the only prospect of the success of an attack is to obtain superiority of fire."

During the Russo-Turkish War in 1877, the Russians lost 4000 men in attempting to carry the great redoubt at Plevna, and yet the defenders, although gallant fellows, were ill-instructed in the use of their arms, and fired wildly and at random.

Enough has been said to warrant the assumption that the universal introduction of long range magazine rifles and smokeless powder will confer greater advantages on the defense than to the attack, and that troops of good quality, well posted under suitable cover, and having an unlimited supply of ammunition, will not be turned out of a position by a purely

frontal attack, unless very greatly outnumbered or badly shaken by artillery fire.

No mention is made in *Infantry Drill*, 1887, of magazine rifles or smokeless powder, and consequently no changes in tactics or fire tactics are hinted at. It is for us to consider whether any changes are imperative, in what direction they are likely to be, and if our regulations are sufficiently elastic and comprehensive to meet them. If it be correct that the defense has gained considerably by the introduction of modern rifles and smokeless powder, it may well be asked how then is the attack to be carried out? Simplicity of form of attack, speed, intensity of fire, and well-timed turning movements must be the dominating factors in any changes in the tactics and fire tactics of the attack.

The Germans, who are thoroughly practical soldiers, expressly forbid in their "Field Exercise" any normal order of attack. They say "that in war circumstances always varying play the most important part, and that the letter kills the spirit." This is doubtless based on the experience gained during the Franco-German War. They consider that if the young soldier is thoroughly drilled and diciplined, it is of no use always practising him in one stereotyped form of attack which the varying circumstances of actual combat might not render suitable; but that if practised to act according to circumstances he is less likely to be hurried and confused when called upon suddenly to meet the enemy. The main principles of the attack would appear to be the same in all European armies, but the form differs. It is generally recognized that the force destined to carry out the actual assault must be a distinct body from those who prepare the way. In "The Austria-Hungarian Field Exercise" it is laid down amongst the principles which are to govern the conduct of an engagement with the enemy "that unless the artillery fire is superior to that of the enemy the attack has no chance of success and that the true form of attack is an uninterrupted advance." The Russians say: "It is not the fire of the enemy which destroys the advance so much as the manner in which the advance is conducted; the chief faults generally observed are prolonged halts, wild firing, and an uncertain objective."

The present form of infantry attack as laid down in *Infantry Drill*, 1889, is far more practical than any of the numerous forms of attack which have been practised during the last twenty years; but it is open to doubt whether it would be possible in the face of the fire of modern rifles and machine-guns, with smokeless powder, to advance over ground at all open, in the manner that the attack is practised here at field days, or as field firing is as a rule carried out, without suffering such losses as would inevitably cause the attack to fail. Losses are, of course, inevitable, and no possible form of attack that the ingenuity of man could devise would prevent them, but it may be possible to train our troops to push on more rapidly to the decisive stage than is done at present.

It may seem presumptuous to attempt to forecast in what direction a change in infantry attack tactics is likely to be made, but we may yet resort to a modification of the tactics of former days and again see a cloud of skirmishers advancing in one general line and covering by their fire the

troops destined for the assault who would push on in a loose line. Carefully timed enveloping or turning attacks should be carried out in a like fashion when the nature of the ground permitted. The same careful training which made Craufurd's brigade and the rifle battalions in the Peninsula unsurpassed as bold and active skirmishers, would soon produce battalions in the present day equal to the task of covering an attack, using their own judgment when to fire, and pushing on rapidly over the ground far quicker than the present methods of section volleys, and advances by alternate fractions.

The definite objective points having been determined upon and communicated to all concerned, special troops supplied with an unlimited amount of ammunition would, together with the machine guns, take up favorable positions for assisting and covering the advance by a heavy and sustained converging fire.

In dealing with infantry tactics, the possibility of night marches and night attacks must not be lost sight of.

In order to bring a night attack to a successful issue not only is it absolutely necessary that all the arrangements are thoroughly understood by all concerned, but unless with highly disciplined troops, a night attack would probably fail; and even with the best troops, to insure success it must be in the nature of a surprise. The attack on the lines of Tel-el-Kebir was carefully planned and delivered at the right moment, and its complete success justified its conception and execution. It would be rash to argue from this bright example of the dash of British soldiers that in the future night attacks will be the rule and not the exception.

Great attention has been paid of late in Russia and Germany to the training of troops in night operations, and here, at Aldershot, during the past six months much good work has been done in the same direction.

At Hythe a regular system of night firing, using luminous sights, has been introduced, but it is open to grave doubt whether any firing at all should be permitted in night enterprises; and when firing at very close quarters is unavoidable, sights, whether luminous or not, would be of little or no use.

Night marches are proverbially harassing to troops and they require to be practised, as, unless with careful guides, the direction is very apt to be lost. On the retreat to Corunna one brigade after marching all night found themselves near their old camping ground. Night marches for the purpose of moving troops up to their positions previous to an attack are likely to be made use of to a much greater extent in the future than has hitherto been customary.

As regards cavalry, the possession of a magazine carbine will prove of great advantage, and its introduction may bring about some radical changes in the arm, equipment, and method of fighting of this branch of the service.

Cavalry is essentially an arm of offense, and we may in future see cavalry divided into two distinct categories with different functions. Heavy horsemen armed with lance and pistol, whose rôle would be to charge the enemy's horsemen or infantry when dispersed and shaken, and light horsemen armed with magazine carbine to act as a general rule dismounted. In

other words, there will probably be cavalry pure and simple acting by shock, and mounted riflemen.

We have now to consider the practical training of our soldiers in the use of the new rifles, and if any radical changes are necessary and desirable. When the Council of the Aldershot Military Society did me the honor of asking me to deliver a lecture, I was not aware that H. R. H., the Commander-in-Chief, had done me the honor of selecting me for the appointment of Commandant of the School of Musketry, and as for thirty years I have directed my arrows against the Hythe system, I feel that the appointment has been made on the principle of turning a poacher into a game-keeper, and where I meant to scoff, I now remain to bless. But, gentlemen, do not mistake me; my blows have been directed against the musketry of the past, not of the present, and as for the future, I shall, of course, be the staunch supporter of the Hythe system, whatever it may be. Musketry made a bad start in our service; instead of making it part and parcel of the regimental life and training and mixed up with the daily drill and exercises as it should be, it was carried on as a separate sort of extra training. The result of this was that generals, commanding officers and adjutants, with few exceptions, hated and loathed the very name of musketry.

The chief object aimed at was uniformity, and that perhaps was the sole merit of the old system; every non-commissioned officer and man in the army, almost without exception, had to fire the same number of rounds, and every shot fired was recorded and sent to Hythe.

Field firing was unknown and the ammunition was expended in steady Wimbledon style shooting at fixed targets at known distances under conditions the very opposite to what the young soldier would find on service. If there was more than a gentle breeze blowing practice was often stopped for fear of spoiling the average, and it was of common occurrence to see the musketry instructor on one side bending over the soldier to adjust his sliding bar, whilst the sergeant instructor on the other gently manipulated the paper wind-gauge. What was the practical outcome of all this? Why, that our men became many of them fair, some of them good shots, under certain fixed conditions, but had no practical training whatever in service shooting. We may be thankful that all that is now past and gone never to return.

Some of the old leaven may still linger on, but we are now on the right track.

It is very probable that the introduction of the new rifle will render some changes in the present system of musketry instruction advisable. It would be premature at this early stage of progress with the new arms to say much about future changes, but they will assuredly be based on the opinions of selected officers and non-commissioned officers who have had regimental opportunities of watching the performance of the men with the new weapon.

I have often been asked what is the superiority of the new rifle over the Martini-Henry? I have also lately had letters from India referring me to an account of a shooting match which took place a short time since at Hythe between picked teams with a result that the Martini-Henry more than held its own.

The superiority of the .303 magazine rifle over the .45 Martini-Henry, consists in—(1) the greater extent of ground which the soldier can cover without altering his sight; (2) the greatly diminished recoil; (3) greater accuracy at all ranges, but more especially at the long and extreme ranges; (4) increased penetration; (5) lightness of ammunition allowing of 115 rounds being carried for the same weight as 70; and lastly (6) the power of pouring in nine rapid shots in succession at a critical moment without having to reload from the pouch.

As regards the shooting it is very probable that trained soldiers thoroughly accustomed to the Martini-Henry would not at first make better range practice with the new rifle, especially at short and medium ranges.

Recruits will assuredly make better practice, and for quick snap shooting, the new sights will be found to give better results than the old. I firmly believe the new rifle to be a thoroughly sound and practical soldiers' weapon, and increased familiarity in the use of it will increase its popularity and improve the general shooting of the army. It would be impossible for us to lay too much stress on the necessity and importance of very careful instruction in its use, how to keep it in good working order, and how thorough should be the training of the recruit in these essential points.

It would be an excellent thing if every officer and non-commissioned officer went through a special training under the armorer, and for this purpose one or two rifles in each battalion should be set apart for instructional purposes in the care of arms and all the details of the weapon.

The old relic of imaginary smartness which still lingers in some battalions of making the butts "tell" when coming to the order must certainly be stopped, and 1000 men should come to the order from the slope on flagstones without a sound being heard; this should be a test of good arm drill.

It has frequently been asserted that the shooting of our men on service is indifferent, not to use a stronger term. If this is the case, I submit the question as to whether our training is of a sufficiently practical nature? There can be no valid reason why the British soldier should shoot worse than any other; on the contrary, from his physique, temperament, characteristics, and inherent good eyesight, he possesses all the qualifications necessary to make him a good rifle shot during the turmoil and excitement of an engagement.

For many years there was an outcry that the amount of ammunition allowed was insufficient and a large increase was made in the number of rounds fired by every soldier annually.

Speaking as Colonel Slade, and not as the Commandant of the School of Musketry, I would say that I do not attribute so much importance to this increase in the number of rounds. It is the manner in which the rounds are expended that is the important point. There are three main principles which should govern the instruction of our soldiers in musketry.

First, that too much time and trouble cannot be spent upon the careful and thorough grounding of the recruit in the use and care of his rifle and the use of the sights up to long and even extreme ranges, his future shooting on service depends in a great measure on the instruction he first receives. The

amount of ammunition for teaching a recruit should be practically unlimited. Some men may require 300 or 400 rounds before they are fit to shoot with their company.

Secondly, that when a soldier has once thoroughly learnt the power of his rifle and what can be done with it at a fixed mark, such as a bullseye, at known distances, and what effect different wind forces have on the bullet at various ranges, no other description of shooting is of much or any practical value but field firing, with the exception of skirmishing and rapid magazine volleys at medium and long ranges.

And thirdly, that all field firing and field firing drill should be carried out in service order; the valise need not necessarily be carried, but the soldier should certainly carry his haversack not rolled up, but with something in it to represent a couple of days rations, his great-coat or blanket, and water-bottle full, and if possible a full supply of ammunition, or equivalent weights. One of the chief causes of wild and indifferent shooting on service is that the young soldier is not accustomed to fire under service conditions. He has hitherto been drilled with a nice flat pouch, and taught to shoot and also practised, in drill order, carrying 10 or 15 rounds, which he frequently does not put in his pouch at all. When he takes the field he is astonished to find instead of his nice flat pouch, two bulky heavy pouches full of ammunition sticking out so that he cannot handle his rifle with ease, and the weight and drag causing him discomfort, he also finds that the braces which support the pouches prevent him from bringing the butt of the rifle into the shoulder with the same freedom as in drill order.

I venture to lay great stress upon the above and consider that all field firing and skirmishing, sectional, company, battalion, and brigade, should be practised and carried out in light service order. It is a great mistake in my opinion to send recruits to musketry too soon, let them be thoroughly drilled and disciplined first, and be perfectly instructed in the care of arms so that they know how to clean and take care of their rifle as well as an old soldier, then let them be taught to shoot, which, by the bye, is by no means an easy matter, and is really quite a special gift.

One of the chief difficulties a commanding officer has to contend with is to find a sufficiency of good instructors, not only for musketry but also for drill. There are many other points connected with musketry which might be touched upon, but enough has probably been said on this and other subjects to pave the way for any remarks from officers who have opinions and views of their own. I only regret that it was not possible for me within the limits of a reasonably brief lecture to go more fully into such important questions.

I feel very much honored by the presence of so many distinguished officers here to-day in whom the army have every confidence, and more especially by that of the Adjutant-General to the Forces, who has so kindly taken the chair. I hope he will permit me to say that all the recent changes in musketry and the present issue of the new rifle are entirely due to his initiative, and I sincerely hope that he will extend to me in my new capacity, as Commandant of the School of Musketry, the same support and encouragement that he has done to my predecessor.

DISCUSSION.

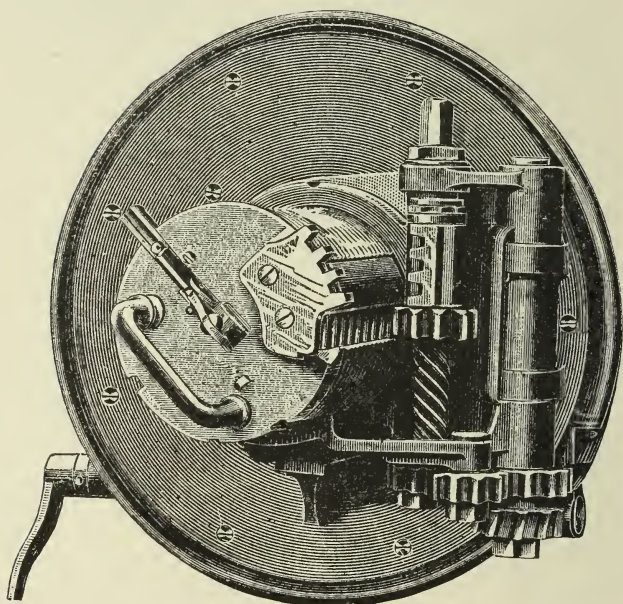
Colonel LONSDALE HALE : Colonel Slade's lecture is full of the most important and interesting questions, but one of them, second in importance to none, has been but slightly touched upon in the lecture, has hardly been referred to in the discussion, and seems to have dropped into the background, viz., the tactics of the battle-field of the future. I could not quite understand what Sir Evelyn Wood meant when he referred to the losses of the future. If the losses are not to be far greater than hitherto, may I ask what is the purpose of the introduction of magazine rifles ? What is the use of all the improvements in fire-arms of the present day ? Why have a rifle at all ? Why not go back to the smooth bore ? Why have artillery been spending so much time in the improvement and study of new arms, fuses and projectiles ? Listening to some of my friends on this matter I am led to believe that they think the battles of the future will, as regards losses, be like the battles of the past, and that all those modern inventions are to make themselves felt in theory only and not in practice. Gentlemen, we must face the stern fact that the man-killing power of the weapons of to-day of our own and of foreign armies—unpleasant as it may be—is far greater now than it has been in the past ; and that the efforts of all nations have been directed towards this one purpose—the making of their weapons more destructive to life. The battle-field of the future will be much greater in depth and width than hitherto, and I fail to see how, knowing this, it can be deemed that the shower of lead which falls at all degrees between the horizontal and the vertical upon this area, and which, owing to the introductions of these quick-firing weapons must be enormously greater than it has been hitherto, will not carry a greater amount of destruction with it. Not only will, as hitherto, every bullet have its billet, but ten times the number of bullets will be seeking their billets. I have been reproached in some quarters for pointing out the increased destructive power of modern weapons. I have been told that doing so may shake the courage of the British soldier. If he is going to have his courage shaken by that, and prove untrue to his traditions, and be more frightened than the Germans, who acknowledge this increased destructive power, and look it in the face, he had better go out of the army, but I don't myself think the knowledge of an increase of danger to his life is likely to make the British soldier show the white feather. The danger is that we won't face the fact, and some of us support the bringing up of our officers and men in a fool's paradise, by telling them that the battle won't be so bad after all or even worse than it has been. But when they get on the battle-field they will assuredly find out they have been living in a fool's paradise, and this revelation coming unexpectedly will be disastrous. I am sometimes reproached for being a " German " in my views. I was able, I think, in a lecture I had the honor of delivering here the other day to show that I am alive to the faults of the Germans as well as to their virtues. But the reason I do look to the Germans for sound instruction is because their military motive power is the instinct of self-preservation. We in England are surrounded by a big ditch and have a sense of security which the Germans have not. They have no such ditch, and they know that unless they have the best army and the very best weapons they are doomed. There is a society at Berlin where military lectures are delivered, and from one delivered in December by a battalion commander there does not seem to be the same sort of antipathy as with us to look hard facts in the face. That officer put forward his views as regards the battle-field of the future, and the difference between its tactics and those of the past. The conclusion at which he arrived is that the losses of the future will be enormous, so much so that the accepted tactics even of the present day, which, you will remember, are very different from those of 1870 and 1871, are no longer applicable to the weapons of the future. Let me remind you that practically the weapons of the future are new, and with " new weapons new tactics." The German lecturer says that what those

tactics must be no one can tell. I hear officers say "I don't like that German drill book, it gives me no distances." The German lecturer tells us that the reason of drawing up the drill book in its present form is because the future is at present impenetrable. Something must be given to go on, but the tactics adopted must be left to the officers who have to carry out the attack. The days of supports in the attack seem absolutely past. They have given it up in the cavalry. The one thing in the future will be the fighting line. There will be no supports, as ordinarily understood, for the simple reason that the supports will never arrive there in any sort of form, owing to the losses they will incur, and the only use the second line will be is to feed the fighting line. The fighting line will have to present a broad front of fire, and the idea of carrying a position by weight of the assault will be out of the question. Those views may be right or wrong; but at all events I do not believe we should have had those views put forward in Berlin without some sort of sanction from the authorities. Our duty, gentlemen, will be to first induce regimental, and especially company officers, etc., to realize their enormous responsibility in the future. Perhaps they will adopt the advice of the German lecturer, who urges them strongly to go and *see* the fire, artillery as well as infantry, at practice, and to try to realize what the power of the fire is, and then to work out for themselves how they will act on the battle-field. That is the thing—try to realize the enormous change that has taken place of late years and the amount of responsibility that rests upon them. The higher ranks have also to realize their new functions, those of superintendence only, and they must learn to give in peace time to the regimental officers all possible opportunities for exercising themselves in the discharge of the responsibility which has come upon them. In my humble opinion very much of the tactics of 1870 and 1871 are ancient history indeed, and the tactics of the future are yet to be born.

Colonel SCOTT: I am a firm believer in artillery fire, and I heard the remark just now that after two hours bombardment only two shells fell into a rectangle representing a village 90 yards square. I was at Okehampton two years ago and last year, and I noticed three batteries of artillery firing into the same rectangle with the result that over 50 per cent. of shells fell into this village. On one occasion when Sir Evelyn Wood was there I saw a gun fired at an unknown range, afterwards found to be 2900 yards, and at the third shot the whole of the gun detachment was killed and the gun dismounted. I have also seen a black kneeling dummy picked out of a row of white dummies, and two feet square targets constantly struck in three shots, at unknown ranges, varying from 1900 to 2300 yards. I will undertake to affirm that any infantry officer, under proper direction, will be able to do likewise. Such being the case, there must have been something seriously wrong in the conduct of the fire of the battery, which could only plant two shell, out of several fired, in two hours, into a village 4500 yards distant and 90 yards square! Colonel Slade spoke about the effect of smokeless powder in its bearing on tactics. It strikes me if we have smokeless powder—which I suppose we shall have shortly—that the two contending armies will be able to see each other so much plainer that it will be a much more unpleasant task than heretofore for infantry to advance against any position or against each other, and, consequently, they will more than ever require to be well supported by artillery. And I cannot help thinking that when the critical moment comes for the infantry to advance to the attack, that they will not only expect, but instinctively and eagerly long for the invigorating sound of their own artillery pounding away behind them, to help them in performing their arduous duty. After what has been so ably expounded by Colonel Hale on the subject of tactics, I feel great diffidence in making any remark except to agree with him that unless we study and thoroughly grasp the effect of fire of all arms, *i. e.*, the danger zones created by artillery fire, rifle fire, and machine guns, it is impossible to

arrive at any sound idea of what modern tactics should be. I might also mention that I did not hear Colonel Slade mention anything about the modifying effect of ground upon the effect of fire, and, consequently, upon tactics. This is a very important point, and should be taken into account. I have had a great deal to do with musketry, and I have heard with interest what Colonel Slade has said with regard to musketry instruction. I think everybody must endorse what he says as being perfectly true and good to accept.

Military Notes.

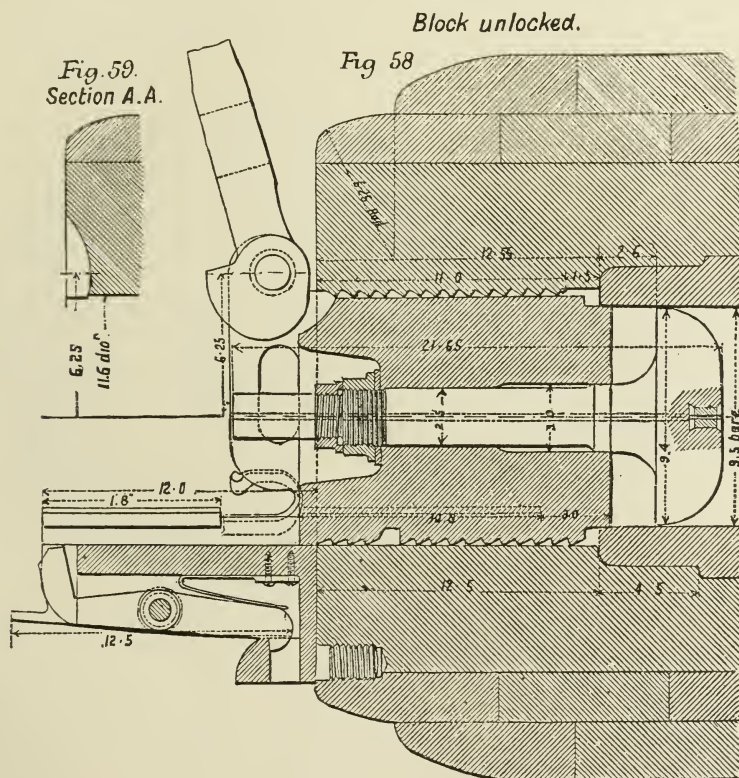


MODERN FRENCH ARTILLERY.

UNITED STATES MODIFICATIONS OF THE FRENCH SYSTEM.

THE details of the French system of breech-loading mechanism, as adapted to an 8-inch steel rifle of the class made for the United States Government at the West Point Foundry, New York, comprise four principal parts of mechanism: the breech-block; the spindle, the inner end of which carries the mushroom-headed obturator bolt; the lever, and the swinging bracket. The breech-block, which, of course, is of tempered steel, has smooth surfaces, over three sectors of the circumference, the other three being threaded; the last thread at the back of the block is left complete to arrest the block at the proper point of insertion when the threads are in a position to engage, one-sixth of a turn completing the locking; this operation of turning carries the block forward .125 in. and forces the obturator pad into place. The diameter of the chamber of this gun is 9.5 in., which corresponds to the diameter of the

end of the breech-block in advance of the threads. The maximum diameter of the breech-block seat is 11.06 in., that measured to the bottom of the threads is 11.04 in., and to the top of the threads is 10.50 in. The total depth of the block seat is 12.5 in., of which 11 in. are occupied by the threads. The thread commences about .8 in. from the rear end of the block, the pitch being .75 in. Two of the sectors have the threads interrupted by a recess nearly 1.5 in. wide; this is to receive the corresponding projections on the bracket to hold the block when the breech is open. The rear of the block is formed with a tapered recess 3.65 in. deep, 6 in. in diam-



eter at the back, and 5 in. at the front part of the recess; further the block is bored through with a central hole, 2.46 in. in diameter, to admit the spindle carrying the obturator head. Curved handles are formed symmetrically on each side of the block, and these, with the lugs to which the lever is attached, are cut from the solid piece of which the breech-block is formed. The spindle is clearly shown in Fig. 58. The mushroom head is 2.9 in. thick, and its normal position is somewhat less than 3 in. in front of the block, which allows space for the gas check; the diameter of the head is 9.4 in., allowing a clearance of .1 in. in the powder chamber. The spindle, where it joins the head, is 2.995 in. in diameter, and passes into

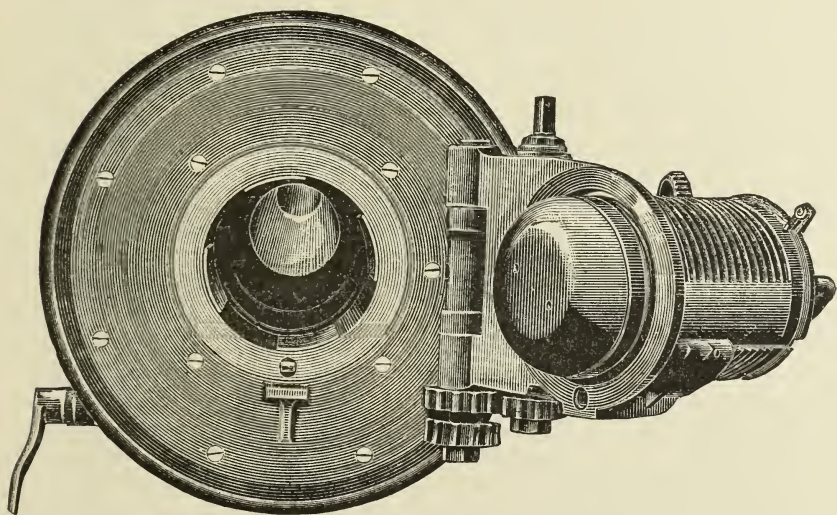
the hole in the block, which for a length of 5 in. is 3 in. in diameter. The enlarged size of the spindle is only 2.75 in. long, beyond which it is reduced to 2.46 in., as far as the threaded end at the rear, which is of two diameters, as shown. Two adjustable nuts and a copper washer are placed on this part of the spindle within the recess in the block. The position of these nuts is regulated by the thickness of the gas check pad, and they have reverse threads to lock the spindle. Beyond these nuts the spindle is extended for 3.65 in., and with a reduced diameter of 2 in. The spindle is drilled on its axis from end to end, to form the vent; the diameter is .2 in., except in front, where the mushroom head is bushed with copper and the diameter is reduced to .10 in. The lever is pivoted and supported between the handles of the block by a bolt that passes through the lugs provided (see Fig. 58), and around which the lever revolves. This lever has three functions: When the handle is upright it serves to revolve the block, either for locking or unlocking; when the block is turned to the locked position, and the lever is thrown down, the eccentric at its hinged end enters a recess cut in the body of the gun and locks the block; and when it is desired to draw out the block after it is unlocked, a downward pull on the end of the lever forces the eccentric against the breech of the gun, and starts the block. When the gun is closed and locked, the position occupied by the lever is that shown in Fig. 58, the lower part of the handle being caught by a spring attached to the bracket.

The swing bracket is that part of the breech mechanism which serves to support the block when it is withdrawn from the gun, and on which it can be thrown back out of the way for loading. The bracket is attached to a hanger which is bolted to the breech of the gun; the top and bottom of this hanger has projections through which passes a hinge bolt and secures the bracket to the hanger.

The bracket is a strong casting, the end where it is secured to the hanger being 9 in. deep, and drilled for the hinge bolt to pass through. The bearing table is 12 in. long, and is curved accurately to the form of the breech-block; at the outer sides are two projecting guides of a clutch form. The level of the table coincides exactly with that of the bottom of the breech-block; the positions of the guides correspond with those of two grooves cut longitudinally in the block. Flanges beneath the table serve to strengthen the bracket and to carry the latch, which is an important detail in the mechanism. When the bracket is turned so that the inner face of the table is in contact with the breech of the gun, and the breech-block is unlocked and started, it can be pulled out by hand upon the bracket, the guides controlling the movement and holding the block steady. The latch, which is shown in position in Fig. 58, serves the double purpose of holding the bracket fixed, while it is in position to receive the breech-block, and afterwards of keeping the latter in its place when the bracket is swung back. The latch is hung on a pin about the middle of its length, this pin passing through the flanges underneath the table; a bent spring underneath the table presses on the top of the latch and tends to hold it down. When the bracket is swung round to receive the breech-block, the inner end of the latch, which is formed with a catch, rises over a curved stop screwed into

the breech of the gun, and when the bracket is in its final position the latch falls into a recess in the stop, and keeps the bracket fixed. When, however, the breech-block is fully withdrawn, the outer end of the block strikes a finger projecting from the other end of the latch, lifts it from the recess in the stop, and as soon as the bracket is turned, the bent spring throws up the latch, engaging the finger with the end of the block, and holding the latter part. When the bracket is again swung round for closing the gun, the reverse action takes place.

The operation of the breech mechanism is as follows: The block being locked, and it being desired to reload, the lever is pulled upwards through an angle of 180 degrees, and when in this position it is turned round through one-sixth of a revolution, when the pin on which it is mounted



strikes against the stop provided for the purpose; the lever is then pressed downwards to start the breech-block, and it is then lowered until its end rests against the rear of the bracket, which has been brought against the breech of the gun, and is held by the latch as above described. The block is withdrawn from its seat by pulling the handles, the relative positions of the various parts being such that the grooves in the block take on to the guides on the bracket. A sharp pull is required to fully withdraw the block, and when the latter arrives at the end of its travel, it strikes the latch, becomes locked, and at the same time releases the bracket, which can be swung back clear of the bore. After the charge has been inserted in the chamber, the bracket is turned back, and on coming into position is locked by the latch, which at the same time releases the breech-block. The lever is then raised, and the block is slid forward into its seat until the first thread strikes its bearing; the lever is then turned through one-sixth of a revolution, and the block is locked, the operation advancing it through .125 in.; the lever is then pulled down till the lower end is caught in the spring. It should be mentioned that in this arrangement a gas check fuse is em-

ployed, and that the obturator pad is made of the usual mixture of asbestos and suet.

The Canet System.—The company of the Forges et Chantiers de la Méditerranée, which has, during the last few years developed, near Havre, a very large and important gun factory under the general direction of M. Canet, has perfected a system known by the name of the director of the works, and which comprises many important modifications of the standard French system. The guns of large and small calibre made at these works are known by the general title of Canet ordnance, and as we shall see later on, they possess many details of novelty and interest. Confining ourselves for the present to a general description of the breech mechanism, we find that the Canet guns both for naval purposes and for coast defense, are fitted with breech-loading devices on the stripped screw system, but into which many improvements have been brought. Obturation is always effected by means of a modified De Bange plastic wad of a special form, which is designed to avoid any hardness or inconvenience in working, and which in varying sizes is used for guns up to the largest calibres and highest powers. In certain cases the stem of the head holding the wad in place is fixed, and the head instead of being mushroom-shaped is in the form of a ring, but with this latter type the stem is movable with the head; by this arrangement, while the same pressure on the breech-block is maintained, an increased pressure is thrown upon the obturator, and as a necessary consequence, a better obturation is secured with low charges—a very obvious advantage. The mushroom is attached to a movable stem, which passes through the axis of the breech-block. This stem, which is drilled through for the fuse, is formed at the rear end with an enlarged opening, the front being bushed; the spindle changes its position according to the extent to which the obturating pad is flattened. Firing the gun is effected by means of a bolt composed of two parts, one of which slides in a groove in the ordinary manner; this circular groove is cut on the rear face of the breech and the tail of the bolt engages in it. The other part of the bolt, following the axis of the gun, is connected to the first by a slide. This second part of the bolt can be made fast with the movable stem by a piece, in which, however, it is free to slide easily when it follows the movement of the bolt. From this arrangement it follows that that portion of the bolt mounted on the movable stem is free to follow all the movements of the latter, while it remains at the same time in connection with the first part of the bolt on which are mounted the percussion and safety devices. The firing mechanism consists of a hammer which is movable around an axis, and carries at its tail end a small roller which is controlled by a spring. The detent is formed by a special forging, on which are placed four fingers; these are mounted parallel to the axis of the breech. The first finger carries the ring of the firing cord, the second takes a bearing when the hammer is lifted, and under the action of a spring, in a lateral recess cut in the side of the wing of the hammer, prevents the latter from falling upon the fuse. The third finger opposes this by stopping against a projection on one side of the hammer, and so prevents this latter from coming in contact with the percussion fuse, if from any cause it becomes released without having been pulled by the firing cord. It is only

when this cord is drawn that the projection is removed and allows the hammer to strike the fuse. The fourth finger, which engages in the groove of the breech-lock, prevents all movement of the axis of the detent so long as the bolt is not in its proper position and the striker is not exactly in range with the fuse. It is only in such a position, when the fourth finger is opposite an enlargement made for this purpose in the slide of the bolt, that the detent can act and the hammer fall. During the rotation of the breech-screw the tail of the bolt remains engaged in the groove formed in the body of the gun, and the bolt is thus kept absolutely fixed. It is only when the breech is completely closed that the enlargements made at the upper and lower ends of the groove allow the bolt to be raised for putting the fuse in place and to be afterwards lowered to make ready for firing. This system of breech-block is thus provided with a triple safety apparatus, because the gun cannot be fired : 1. So long as the breech is not closed. 2. So long as the striker is not exactly over the fuse. 3. Firing is impossible except by pulling on the firing cord. All parts of the mechanism are moreover very simple, easily cleaned and maintained, while the working of the system presents very little inconvenience. The working lever pulls over, and is formed with a cam which, when the breech is closed, holds the block firmly locked. When the threaded sectors of the block are turned so as to be clear of the threads in the bore, by pulling over the lever the same cam which takes a bearing against the body of the gun assists in slackening the obturator in the usual manner.

For the manipulation of the breech mechanism in heavy calibres, special appliances belong to the system above described, which allow the man serving the gun to carry out all the various operations by means of a single lever which is turned only in one direction. The rear face of the breech-block has fitted to it a toothed sector gearing into a rack carried upon a movable nut mounted on a vertical screw which is attached to the console. When the screw is turned, the nut rises, and the rack acting upon the toothed sector turns the breech-block. When this movement has been carried sufficiently far to release the threads of the block from those in the bore, the nut is stopped against the upper bearing of the screw, which then actuates the pinion which is cut with heliocoidal teeth, and attached to the nut ; this pinion gears into a rack cut in the side of the breech-block and withdraws it from its seat in the bore. Whilst this screw is being turned the tail of the bolt that carries a small roller rises up a curved path fixed upon the back of the gun. As the bolt rises, the tail of the hammer comes against a stop that forces the dog to lift and produces an automatic safety arrangement. When the screw has arrived at the end of its travel, the pinion butts against the extremity of the threaded portion and becomes fixed. A bolt upon the console of the gun is thrown out and the whole system swings around the axis attached to the gun ; the arrangement of this console bolt is very simple and no springs are employed. The pivot has mounted on its lower end a pinion which is turned by means of an endless screw upon a shaft worked by a crank. The various operations can be performed either by hand, by means of hydraulic apparatus, or by belt transmission. The breech-block is fitted with a triple safety apparatus, which makes it impossible to

fire the gun: 1. Until the screwed part of the breech is not completely home in the bore. 2. So long as the bolt is not immediately over the fuse. 3. Unless the firing is performed by drawing on the lanyard. The great advantage of this system is that it can be manipulated in every position of the gun by only one man, and by turning a crank always in the same direction. The operations are, moreover, easy and rapid on account of the convenient arrangement of the different parts, and especially on account of absence of complicated mechanism. The system has been adopted by several countries—Japan, Greece, Chili, etc.—both for naval and coast defense guns.—*Engineering*.

RANGE-FINDING: ITS DESTINED EFFECT ON TACTICS.

A lecture on this subject was delivered at the Royal United Service Institution by Lieut.-Col. A. W. White, R.A., Instructor in Range-finding, Aldershot. Colonel White began by explaining that he did not intend to weary his audience with the technical details of range-finding instruments, still less to propound any original theory of tactics, but to submit the subject of range-finding as a satisfactory solution of certain military problems of primary importance, and with this end in view to state concisely what can now be accomplished by its aid.

In the first place the lecturer explained some prominent features in the tactics of the present day, which are distinctly traceable to the difficulty of correctly estimating time and distance on the field of battle, and showed that every arm suffers a distinct loss in its want of power to judge of distance and speed in military operations, and that in consequence the tactics of infantry are dwarfed, those of artillery are distorted, machine-guns are wasted and cavalry are blindfolded. Range-finding is the remedy which the mechanical genius of the age offers us for the tactical difficulties it has itself created. Range-finding has not, as is generally supposed, been under trial for years, and it is, in fact, only just beginning to be tried now. Range-finders have; but that is a very different thing. Range-finders, however perfect, no more create a working system of military range-finding than horses constitute an efficient cavalry or rifles a trustworthy infantry. Range-finding instruments will be found in endless variety in England and on the Continent—over a hundred designs, some good, some bad, some indifferent; but range-finding as a military system exists in the British army only, and only in one branch of it—the horse and field artillery; moreover, in that even it is as yet but in its infancy, and in consequence on a more advanced footing in batteries at home than in batteries abroad. Much remains to be done; still much has been done since 1883, when the first step was taken toward method and uniformity in this matter, and now, whatever our shortcomings may be, we are at any rate far ahead of all the other European armies.

Field-range-finding has for its main object to place every one on the battle-field in the position of being always at one end of a measured range with their objective at the other end. Speaking generally, range-finding may be divided into two classes—1. Deliberate, for observation of fixed objects at all ranges. 2. Instantaneous or semi-instantaneous, for stationary

or moving objects at the shorter ranges. As a good example of deliberate range-finding, the lecturer gave a short *résumé* of what can be done by means of our service artillery instruments; and, as a fair specimen of instantaneous range-finding, he described certain results recently obtained at Aldershot, using our old service infantry instruments. The system of range-finding introduced some years ago into the drill of the Royal Artillery, horse and field, and which is still our regulation system, is limited to the observation of stationary objects by daylight. The point of observation may be either in the target itself or in something noticeable near to it. One man performs the whole of the optical work; but he is helped by an assistant, who is qualified to take his place if need be. Great accuracy at long ranges is the chief desideratum; this is, however, limited by certain restrictions which apply to all instruments carried by mounted men, and required to be used under service conditions. Extreme importance is not attached to the element of time, because it is not intended that the range-finding should, as a rule, be performed when either the batteries or the range-takers are under fire. For the first artillery positions, the range-finding should be completed while the batteries are still in column on the roads or assembling preparatory to taking up their ground. For later stages of the action, it is provided that whenever a move becomes necessary the range-takers should ride in advance, accompanied by an officer, to select the new positions, and so have the ranges all ready for the guns as they come up; this duty being performed under cover—that is to say, in such a way that the advance parties may not be seen by the enemy constituting the new target or posted near to it. Range-finding is, of course, unnecessary for artillery in action against large targets at very short distances. The range-takers of batteries at home have recently been all trained in the School of Range-finding, and have passed an examination which insures that they work to an average error not exceeding 2 per cent. (20 yards per thousand), up to a range of 5000 yards; always provided the object can be distinctly seen by the naked eye, or in the small telescopes belonging to the instruments.

Nothing is more difficult than to say exactly how long to allow for finding any given range, so much depends on local circumstances; but when working on open ground, with no difficulty as to cover or light, the time may, as a rule, be reckoned to be two minutes for 1000 yards, three for 2000, and so on, adding a minute for every 1000 yards. This does not, however, include the time occupied in choosing the position for the battery or in selecting the target or pointing it out to the range-takers, nor does it allow for a second observation, whereas there are many cases in which a repetition of the work (by a second range-taker, if possible) is most desirable. On the whole, therefore, it is useless to pretend that our artillery range-finding is a rapid process. All we may say is, that it takes no longer than ranging without instruments, and that it draws no fire and wastes no ammunition.

Colonel White then touched upon some recent advances in range-finding by novel methods which do not form part of the compulsory course for range-takers, but which represent no small part of the work of the School of Range-

finding during the last two years. The range can be found of any stationary light seen at night. Not only can camps and bivouacs be brought by this means under fire at night, but night marches of moderate extent can be exactly regulated. All that is necessary is to base the orders for the march on a reference to one or more fixed lights, and to supply each independent body of troops with a map and a prismatic compass, in addition to the range-finding equipment, which for this purpose includes a dark lantern. Then, whenever the question is asked, "Where are we now?" the range to, and the bearing of, the light is noted. Reference to the map then at once identifies the spot of ground arrived at.

In 1888 it was necessary, for some experimental practice, to devise a method for finding the range of a captive balloon in motion. This was a most fortunate occurrence, for not only was this done, but a way discovered of finding the range of other moving objects with fair accuracy and considerable rapidity. The ranges of the balloon were easily recorded twice a minute, with an average error of less than 3 per cent., and the balloon, in consequence, was quickly brought to the ground by the fire of a single 12-pounder gun at 4000 yards range. All last summer the range-finding classes were constantly exercised in the observation of balloons and of troops in movement, and no difficulty was experienced. The method, however, needs a few minutes' preparation, and the range-finding equipment of two batteries is necessary.

The ranges of intermittent lights (limelights and electric lights) have also been taken without difficulty, by combining the range-finding of two batteries.

Here it might be asked why we have not hastened to graft these new methods on the regulation drill of the artillery range-takers. The reason is this: Some time before these were even thought of, a new range-finder, which is called the field telemeter, was tried and approved for future supply to the field artillery, and now we are just about to get that supply.

There is at this moment no complete range-finding system for infantry, but range-finders are very generally used by officers as auxiliary instruments. In our army, there are two distinct service patterns, and every regiment of cavalry and battalion of infantry is allowed a set of either of these as a part of its fighting equipment, and a second set of the same pattern for instruction. The School of Range-finding exists, however, for artillery only, and there are no trained observers in the cavalry or infantry corresponding to the artillery range-takers. For this reason partly, and partly because the instruments have been applied in the service only to the observation of stationary objects, range-finding has as yet no real footing outside the artillery. But there are indications of a great change consequent on the introduction of the new rifle and the expectation of smokeless powder. Already the subject has been taken up officially, and there is likely to be very soon a new pattern infantry range-finder especially suitable for the instantaneous observation of moving objects, and superior to anything we have now.

The lecturer then detailed the manner in which in 1886 the service infantry range-finders were adapted to the fire tactics of infantry, and asked his audience to admit that, as we can do so much already with the materials at hand, we are likely to do much more in the future, when both in-

struments and methods have been improved, as there is every reason to suppose they will be. Coming to the subject of the effect of range-finding upon tactics, the lecturer disclaimed all pretension to rank as a prophet, but pointed out some of the immediate consequences of range-finding, and recorded his opinion as to the direction in which we shall be gradually led by the adaptation of tactics to these novel conditions. To commence with infantry, the very first effect of the establishment of a working system of range-finding will be a marked increase of confidence in the rifle, which will react with beneficial effect upon the minds of the men. Marksmanship will be an accomplishment more highly prized than it has ever yet been, because collective skill will once again be able to overcome the mere power of numbers. And of all nations we English will most benefit by the change, for though our numbers are small our personnel is splendid. Have we not among us the best shots in the whole world? The certainty of a knowledge of the range at all times will make it worth while to be able to profit by that knowledge, and there will thus be a twofold improvement, which will enormously extend the zone of reliable fire. Concurrently with these changes there will probably be a distinct economy of ammunition, for it will have a most sobering effect on the soldier to be accustomed invariably to wait for a word of command, which again he knows depends upon a reference to the records of instrumental observation.

As regards infantry, then, we may say that in consequence of range-finding the shooting power of the men will be brought up to the level of the capabilities of the rifle, rapid fire will never be thrown away, continuous fire will be maintained on moving objects, ammunition will be economized, musketry encouraged, and confidence re-established. And it is worth notice that the introduction of smokeless powder will favor these tendencies, and go far to eliminate all remaining elements of chance. As to the effect of range-finding upon artillery, assuming that artillery will eventually possess, in addition to its means of deliberate range-finding, some method of instantaneous observation of troops in movement, it will then enjoy the advantage of its full range, and also be able to operate in the infantry combat without any great sacrifice of either men or horses. Range-finding will do more for machine-guns and quick-firing guns than for any other. By its aid machine-guns will probably become a separate arm, and will at all events, fulfill an entirely new and more or less independent rôle.

The tactical changes which Colonel White considered might follow the acquirement of the new powers indicated are as follows:—1. Extensions from column of route will have to be made at far greater distances from the point of attack than is now necessary; this on account of the increased effective range of artillery. 2. The artillery duel will commence at the extreme range of the guns, unless the nature of the country admits of an advance under cover. 3. No general advance will be possible until the artillery duel has been decided, because—4. Artillery will be much more formidable to infantry and cavalry at long range than it has ever been before. 5. The side which succumbs in the artillery duel will be unable to undertake the offensive except in counter-attack. 6. Machine-guns will probably act in battery. 7. Those of the defense will delay the advance of the attacking infantry.

8. It will be necessary to crush them by artillery fire. 9. Machine-guns will, however, generally silence field artillery within their own zone of effective fire. 10. In all infantry attacks machine-guns will assist, and will be particularly directed against batteries unmasked at machine-gun ranges. 12. Artillery will still continue to support the attack effectively, though it will rarely need to advance to infantry ranges. 13. Frontal attacks on prepared positions will be rarely possible, and flank movements will have to be carried out on the arcs of very great circles. An infantry attack, however, when it is made, will be a far more deliberate operation than is dreamt of now. As regards formations of infantry, the lecturer hazarded the conjecture that the chief object in future will be a maximum delivery of effective fire, and that the tendency will be towards the old English method of getting breadth without depth; a compact, not an open fighting line, fed by supports in extended order at distances so adjusted to the range of the opposing fire as to ensure a minimum sacrifice. 14. Some important general results may also be expected. For example, balloon reconnaissance will be found more than ever necessary, but it will be a far more difficult and dangerous duty to carry out than it is now assumed to be; night marches will be more frequent, especially marches to secure positions for the next morning's operations; electric search lights will draw artillery fire, and so will signal lights; camps will be unsafe at night if any fires or lights are to be seen.

In conclusion, Colonel White added that he knew he was liable to be told that his ideas were unorthodox, according to the standards of 1870, and that with respect to the value put upon range-finding, foreign military opinion was against him from first to last. To this he replied that progress has ever defied prescription, and that, as to foreign opinion, what passes for it in England is often spurious and generally obsolete. The Germans are on the point of abandoning their entire system of battle tactics in consequence of the introduction of their new rifle. Will they not quickly accept the only means possible of properly focussing the long-range fire upon which they now propose to defend in attack as well as defense? Shall we in England adhere blindly to precedents already discarded by those who created them? The harvest of 1870 was indeed bountiful; but may we not perhaps glean too closely in the fields from which the reapers have so long departed? —*United Service Gazette*.

HIGH EXPLOSIVES AGAINST EARTH WORKS.*

CORRESPONDENCE TO THE EDITOR.

Sir:—In the *R. E. Professional papers*, Vol. XIV., in the valuable *résumé* of the Lydd Experiments of 1888, there is one question of profound interest to the corps, which Major Clarke disposes of as follows:

"There never was any reason to expect greater effects against earth parapets from the use of high explosives, but it is satisfactory to know that, in this sense at least, melenite possesses no supernatural powers."

In opposition to the above, I quote the following from Major-General Brackenbury's *Field Works*:

"It appears certain that some high explosive, to be used in common or

* From the *Royal Engineers Journal*, April 1, 1890.

even in double shells, will turn out to be the reply of the attack to the modern development of defensive field works."

"High explosives as bursting charges for shells have been found capable of actually clearing away everything in the shape of earthworks. It is to be hoped that the British artillery will be provided with some such explosive before our next great war. In this direction * * * seems to lie the future power of field artillery."

The above two opinions are sufficiently explicit to be seen to be diametrically opposed. It would be very valuable to have further information from the experiments of Lydd, or elsewhere, to support the opinion that Major Clarke gives us. I am, etc., A. E. HAYNES, Captain, R. E.

THE TRAINING OF THE GERMAN CAVALRY AS COMPARED WITH THAT OF THE ENGLISH.

At the Royal United Service Institution, a paper on this subject was read by Major J. C. Ker Fox, late German and English cavalry.

The lecturer, observing that on October 1 the recruit in the Prussian cavalry commences his task of learning to be a soldier, and on the 15th of the following April is expected to be sufficiently trained to take the field, proceeded to describe the course a recruit is put through. The first inspection by the colonel of the regiment takes place about January 23. He then sees every squad in the regiment on blanket and snaffle. Whilst the training of the recruits has been going on the one year and two year men have been going through almost the same course of instruction as the recruits. The German cavalry subaltern during the autumn, winter, and early spring, has from seven to eight hours work every day of the week, and though he may get a day every now and then he, as a rule, cannot expect any longer leave. When the second inspection (about April 15) is over, the captain takes his squadron together for the first time, and after telling off the sergeants and men to the horses they are to ride during the remainder of the season (which in most cases are those they have ridden during the winter), commences a regular course of squadron drill, which lasts from five to six weeks. This is not what in England is described by the title "squadron course," but is limited strictly to drilling the men in the ranks of the squadron, and teaching each as a unit of the squadron to take part in any and every evolution it may be called on to perform. After the first week or ten days, the captain, towards the latter part of the drill, takes all four troops together, and, gradually lengthening this period until the last few weeks before the inspection, he drills the squadron the whole time they are out. The accuracy and steadiness of movement at every pace, the wheels into line and column at a trot and gallop, the long inclines at a sharp gallop, the advances in column and line at a gallop, gradually increased almost to the pace of a charge, which are produced under this system with a good captain, are simply marvellous. After the inspection of the squadrons at the end of May, as a general rule the regimental drill follows, which lasts about eight days, and finishes up with an inspection by the brigadier, at which the division and army corps commanders are present. The drill takes in all possible eventualities which might occur on active service. Silent drill has to

be frequently practised, great stress being laid upon it. The men are taught to ride straight to their front at the regulation pace, with no anxious looking to their right or left, under all circumstances to preserve the intactness of their squadron, and to follow implicitly their own troop leaders. If distances or intervals are lost, they are to be slowly and quietly recovered, and thus all confusion and disorder are avoided. In the drill of a Prussian cavalry regiment there is no exciting galloping about of an adjutant with his markers, no appeals to troop officers to give a base, nor exhortations to other squadrons to conform to it, which too often mark the drill of an English regiment. After the inspection of the regiment has taken place, the outpost work commences. In connection with the subject of outpost duty, the inclination now is to do away with the vidette chain as much as possible, and, in place of it, to have a Cossack post—a non-commissioned officer and four men strong on some high point in front of the picket—with a constant system of patrolling over the ground lying in front of it, with an examining party on the main road leading to the picket, thus saving the strength of men and horses, giving the picket more time to get ready, and also a greater power of resistance. Great stress is laid on correct patrol riding. The various sergeants of the squadron having been practised in small outpost schemes, the lieutenants commence their own summer outpost tasks, of which each has to do one, during the outpost period. Each officer has also during the summer to execute a reconnaissance.

The lecturer gave several instances from the last great war of 1870-71, where lieutenants executed good patrol work, and sent in valuable information. After all the lieutenants have worked out a scheme, the captains of squadrons have also to do one each, with a whole squadron, on a larger scale. This brings us up to the end of the outpost period, about the fourth week in August. The colonel of the regiment now gets his regiment together for three or four days drill, which is followed by brigade drill under the brigadier, and the regiment then marches off to manœuvres, and with these the year's work comes to an end.

Major Ker Fox then briefly referred to the musketry of the Prussian cavalry, how telegraphy is taught, the destruction and replacing of railway and telegraph communication, the swimming of horses, and the entraining and detraining of horses, as also the position and responsibilities of the subalterns and squadron leaders, and the manner in which inspections are carried out, and expressed his belief that conscription is popular, at least in many parts of Germany, it being recognised both as necessary and as tending to improve the youth of the country both physically and morally.

Turning to our cavalry, the lecturer, while professing the greatest respect for and admiration of the British cavalry soldier, provided he is properly instructed in all the duties of his profession by those whose duty it is to lead him in war, considered that our regulations, system of training, and organization conclusively prove that such is not and cannot be the case either with officers or men. He attributed it to three reasons, viz.: to our system of training, which produces inefficient officers, and the absence of a proper system of inspection; to the utter ignorance of the general public about all military matters and military requirements; and to the system by

which our army is administered by politicians, who, sacrificing everything for the sake of a few years' place and power, pander to the wretched and shortsighted outcry for retrenchment, and, through fear of being turned out of office, refuse to apply for the money necessary to render our army efficient, and capable of maintaining the honor and safety of our country. A great deal might be done, the amount of petty crime much lessened, and the recruit made into a much better and more useful soldier, if his troop officer were to associate himself more with his early training and instruction. At least a month or six weeks in the summer should be given up to outpost duty. Theoretical instruction must be combined with practical work, the officers must know every detail connected with the duty of providing for the safety of a force, both on the march and when halted. The men must be told how to ride, how places are to be searched, what to look for, and, finally, how to report what they have seen in the shortest and clearest language. Officers themselves are not thoroughly acquainted with the work, and in fact, many of them know nothing whatever about it. How often are they practised in duties on the march, in outpost work, and in riding patrols? In the two former the number of times may be counted on one's fingers, and in the last—and for the cavalry subaltern, the most important of all—they are never practised. Will any one be bold enough to say that our cavalry compares favorably with the German *as thoroughly trained cavalry* to meet the requirements of modern war? We are not enough in earnest, our officers do not give up the time to learn their work thoroughly, and don't themselves train the men in peace time whom they are going to lead in war. It has not been the custom, and we are very conservative. We must have constant reorganization and improvement. We cannot stand still. We must either improve or deteriorate. If our officers will not face the increased work, let them go, and get rid of the lazy and incapable ones. To those of them who say they are not going to be worked to death, or "humbugged about" by this general or that colonel, and who want to spend their whole time in hunting, shooting, and racing, draw their pay, and give nothing to their country in return, Major Ker Fox would say "Go." Give our officers more responsibility. Let the captains of squadrons and troops *really* command them, and let their promotion depend, almost entirely, upon the results they produce. Finally, the inspections are not frequent enough, nor sufficiently comprehensive. We ought to have every two or three regiments under a permanent brigadier, who would frequently inspect the regiments, and insist on a systematic course of instruction being pursued all through the year, who would back up colonels in getting rid of inefficient officers who either won't work or can't work, and we should then have, in addition to good riders and gallant officers and men, a thoroughly well-trained and thoroughly efficient cavalry.—*United Service Gazette*.

REPRODUCTION OF RECONNAISSANCE MAPS.*

In the last paragraph of Major Talbot's recent paper on "Military Surveying in the Field," he points out the necessity of a portable arrangement for reproducing maps—one that can be used in hot climates.

* From the *Royal Engineers' Journal*, April 1, 1890.

I tried hektographing reconnaissances when on active service at Suakin, in 1885, and found the system would give a dozen good copies with very little trouble. The simplest way to work is to rule lines, dividing the paper on the plane-table into a series of rectangles the size of a half sheet of note paper.

At the close of each day's work, endeavor to have as many as possible of these rectangles completely filled with detail in pencil. Trace in hektographic ink (Judson's violet dye), and apply each sheet to the hektograph, leaving it on five minutes, and then taking off a dozen copies. The tracings can be made on white foreign note paper, and the impressions taken off on half sheets of unglazed cream laid note paper (so as to save cutting to size).

The hektograph can, therefore, be quite small. Paste the sheets on muslin and put it into a card board cover to form a folding map; the advantage of which over a map in one sheet, when required for field use, is obvious.

Half the sheets should be retained and added to the next day's work, thus preserving a connection between the maps sent in. They can be stump shaded and colored if time admits.

There is thus only one copy to be inked in, and any mistakes made in it can be cut out before applying the tracing to the hektograph.

The surveyor should have an assistant, to take off the impressions, wash the hektograph, paste on the muslin, and paint up the roads, etc. Thus, with one man's help he can survey a greater area than by inking in his original sketches and sending them in, because he has no difficulty in joining on each day's work.

The thermometer was generally at 100 degrees by day when the reconnaissances above alluded to were made at Suakin, but I took the impressions off the hektograph during the cool of the evening. They *might* have stuck to the composition by day.

F. MOLONY, Lieut. R. E.

SOME THOUGHTS ON NAPOLEON AND HIS MILITARY SYSTEM.

In these days of study and theory, when almost every month brings forth a new book on tactics, and when organization and administration are continually being altered to imitate those of the latest successful nation on the Continent, it is interesting to cast a look backwards on the system that prevailed in the armies of the most audacious, far-seeing, and capable leader that the world has ever seen. In Napoleon I. genius for war was developed, perhaps, to a greater extent than in any other man who has left his mark on history, and, in spite of the vast victories that have during the last thirty years astounded the world, anything as regards war that met with his approbation, and received the stamp of his talent, cannot fail still to be of absorbing interest. But in war the moral tone of an army, the spirit which animates its men, and the bearing and habits of the officers have an almost equally valuable effect as the mere forms of drill or organization adopted. These, therefore, should likewise be studied, and the system which produced good results in these directions is worthy of our close attention. It is moral force and good discipline which, after all, have in every age won the day, and the same foundations underlie the performances of a Cæsar or of a Na-

poleon. Some very interesting details have been collected and published in Germany recently as to the mode of life and the system of administration which prevailed in the French service under the great man we have alluded to, and have excited considerable interest. A man might become a soldier, it seems, under four conditions: as a volunteer for general service, as a conscript, as a volunteer for the Imperial Guard, or by becoming a cadet at Fontainebleau. Physical capacity was the only qualification necessary to do either of the two first, but to become a member of the Imperial Guard the recruit had to be able to show a private income—in the cavalry of 300, and in the infantry of 200 francs a year; just in the same way as our *sowars* in the Indian cavalry have to show themselves men of some substance ere they are considered eligible. They had likewise to be possessed of some education; while, on the other hand, they might look to gaining a commission as officers after four years' service. There was considerable competition in consequence to gain a place in this *corps d'élite*.

The school at Fontainebleau contained 600 cadets, who paid 1200 francs a year for their education, and who were instructed in topography, mathematics, fortification, geography and drawing, and who did in addition drills and exercises for four hours every day. The best possible officers were selected by Napoleon himself as instructors, discipline was rigid, the fare plentiful, and candidates numerous. These were attracted by the showy uniform; and the magic words about every recruit carrying the *bâton* of the marshal in his knapsack held a glittering bait to the fervid imaginations of the youth of France in those stirring days. Those same words were responsible for much of the feeling that was uppermost in the soldier's mind of the period. The spirit of the gambler was abroad. Men saw that a dashing deed of arms or an act of bravery under the eye of the Emperor might place their feet on the ladder which perhaps led to a kingdom. The leading men of the army had risen from the ranks, and by good luck and personal courage had become dukes and princes, and even kings. Such titles and the spoils of fat provinces were the reward of a soldierlike bearing, and a man felt that it was not for nothing that he risked his life. If the game were dangerous the stakes were high, and Bernadotte wore his crown as a standing example how fortune might favor the brave. Yet, as might be expected, much luxury and extravagance prevailed in the establishments of the senior officers, who, like the successful stockbrokers of our own time, did not trouble much about details of expense after a successful *coup*, but kept armies of retainers and open house. The pay of the common soldier was fifty-two centimes daily, and he also was supplied with bread and firewood in addition. Twelve centimes was deducted from him every day for dinner, and the fare was plentiful, and of good quality. Considering that money at that time represented perhaps three times its present value, the French soldier may therefore be considered to have done well. Ten centimes daily was likewise deducted towards keeping up his uniform and necessaries, and he had always to be in possession of three pairs of serviceable shoes, and three shirts. A man in marching order had to carry his musket, his knapsack, his pouch belt with fifty rounds of ball cartridge, a day's rations, and water-bottle, while every alternate man was burdened in addition with axe

and a kettle. Not by any means an overpowering load, yet it is said that the first night in bivouac saw many of these *impedimenta* cast away. "The war had to support the war," and no magazines or depots of provisions were organized in the front. Therefore the country round was systematically plundered, and excesses and uneven distributions frequently prevailed: one part of a force had perhaps twenty times more than they required, while their next-door neighbors went to bed hungry.

Sutlers and camp followers followed the track of the army in large numbers, and provided additional comfort for men and officers at exorbitant prices. Some of the large Parisian *restaurateurs* had establishments for this purpose at the seat of war, and made enormous profits out of the officers, who usually preferred to pay through the nose for their delicate fare rather than eat the rations they were entitled to. This system of feeding troops was both wasteful and faulty. The inhabitants frequently hid their supplies from the rapacity of the invading swarms, and want was therefore often felt even in rich neighborhoods. The Commissariat department had orders always first to provide for the Guard, and these often fared well at the expense of their less lucky brethren. Naturally, therefore, these gentry were extremely unpopular with the mass of the men, and fully deserved the feelings with which they were regarded by them. Embezzlement and such malpractices on their part were not uncommon, and on the eve of Wagram several were shot by order of the Emperor for selling the rations of his beloved Guard. How his strong head ever tolerated the abuses he can hardly have been ignorant of still forms one of those anomalies which surround his character.

Where churches and picture galleries were despoiled by order of the highest authority, it is not to be wondered at if plundering and marauding were every-day offenses amongst the rank and file. Hundreds of French soldiers were hung for these offenses by the Spaniards during the Peninsular War, and discipline grew so lax that French generals had sometimes to shoot their men for comparatively trivial crimes. It is the fashion to dwell much on the want of discipline displayed during this war by Wellington's soldiers. He himself admitted that matters could hardly be worse than they were with his command in this respect, yet we question whether a more disgraceful state of things did not exist amongst his opponents. It is the custom also to speak of the English force of those days as imbued with aristocratic instincts to a far larger extent than the French. If compared with the armies of Napoleon's earlier days it was undoubtedly so, but latterly, as the Emperor grafted a new aristocracy on the country, the old ways of thought returned, and the sons and relatives of the dukes and princes who formed the Imperial Court gained more rapid promotion, and obtained the best places at the expense of their lower-born comrades, in much the same way as was the custom in royal forces. The vices of a court were likewise soon noticeable. Military service became irksome, and generals grew tired of the incessant bivouac, and sighed for peace and their comfortable Parisian palaces. By the time that Waterloo was fought, all but very few were wearied of the life in camps, and secretly rejoiced at the prospect of a peaceful future. The organization of the Imperial Guard had also a bad

effect on the rest of the army. Their privileges were very great, they marched on the best roads, had the best billets and the best food. Moreover, they were continually spared from fighting, and it was only at the last supreme moment that they were "put in." The best men were selected from the line regiments to fill their ranks, and the Guard flourished to the detriment of the remainder of the army.

In spite of such drawbacks, however, the *morale* of Napoleon's soldiers was, it must be admitted, remarkably fine. They endured hardships patiently, they were wonderful marchers, and were helpful, and equal to emergencies far in excess of what we were or are accustomed to. Their courage in action was above suspicion, and the *esprit de corps* so strong that men who displayed the least sign of cowardice were tried and punished by their comrades afterwards. Napoleon well understood the art of fostering such a chivalrous spirit, and enjoyed opportunities beyond most leaders for carrying out his ideas. After a great battle he invariably held a grand review, when he was received with enthusiastic cheers, and cries of "Vive l'Empereur!" On these occasions, after one of those spirit-stirring harangues, which he so thoroughly understood how to deliver, he inspected the line, and then proceeded to appoint successors on the spot to the places of those who had fallen, and conferred the crosses of the Legion of Honor, or sometimes titles of rank or military position. In this way some lucky regiments which were often with the Emperor during operations obtained an inordinate share of distinctions, while some which had fought equally well under one of his marshals got but little. It is said that on these gala days he liked to ask the officers questions on parade, and loved to get a ready reply, even if it were not quite a logical or accurate answer. He always asked where missing men were, and showed evident gratification if told that they had been killed or wounded with the bayonet. His failing was soon perceived, and in consequence it turned out that an extraordinary percentage were reported as injured by that weapon. Yet even their fire action had become so effective that bayonets were not very often crossed in action, and no one knew this better than the Emperor himself. A noticeable feature of the French soldiers' training was the rapidity and neatness with which they were accustomed to build themselves huts in any standing camp, and the little time it took them to make their dwellings pretty and attractive as well as weatherproof; rows of trees and flowers were quickly planted, and in a few weeks the whole place had a happy and cheerful appearance. During such intervals in hostilities every means was also adopted to restore discipline, to instruct and train the men afresh, to repair and polish the arms dull or rusted by exposure, and to build up once more the fabric of various details that go to compose an army. In spite of the defects we have alluded to, a system which endeavored to foster self-respect and *esprit de corps*, which, while it fully appreciated the value of developing the theatrical and showy aspect of the soldier's life, did not lose sight of the practical ends to be attained, and spared no pains to bring them about, is one which merits our full consideration, and reminds us of much which we might do worse than strive to imitate, even in this age of knowledge and enlightenment.—*United Service Gazette*.

Comment and Criticism.

(The remarks under this head have, except as otherwise indicated, been invited by the Publication Committee.)

I.

"Infantry Battle Tactics."

Col. Thomas M. Anderson, 14th Infantry, U. S. A.

COLONEL ANDERSON said* that he had learned from General William B. Franklin that the history of the three battalion regiments in our Army was this: That before Mr. Lincoln issued his proclamation of May 4, 1861, he appointed a commission consisting of Secretary S. P. Chase, General McDowell and himself, to formulate some plan of Army organization. That they proposed to reorganize the ten old infantry regiments as three battalion regiments of eight companies to each battalion, and to add nine new regiments with the same organization. This would have made fifty-seven infantry battalions in addition to the 75,000 volunteers, and it was thought that this might provide a sufficient force. But when Congress met, the military committees entirely ignored their proposal as to the old regiments but adopted their suggestions as to the new ones.

Colonel Anderson went on to say that just before General Upton went to California, he came to his quarters at Columbus Barracks and spent two days with him, talking over his tactics and changes he thought of making to adapt them to grand tactical operations on a large scale.

He said that Upton favored the three battalion organization for infantry and larger companies, but that they discussed what could be done under the present organization by using the division formation of two companies, as the Germans used their double company columns as a basis for deployments for open order fighting.

The problem was to get the sub-divisions, no matter what they might be called, arranged behind each other in such a way and at such distances that the firing line could be fed by men acquainted with each other and the officers who were to command them. That they figured a good deal on danger spaces and the proper formations in connection with them. That Upton did not see his way clear to adapt his tactics to the new exigencies. The trouble was as to changes of front with either very deep formations or wide extended lines.

With 2000 yards distance between the firing line and the last regimental reserve, the last sub-division would have to swing around too large a segment for prompt action. Then if he gave up his sets of fours, what then?

Colonel Anderson had once tried to talk with General Sherman on the subject of Army reorganization to meet modern tactical problems, and had been met with the proposition that the General of the Army should have his choice of methods and tools. That admitting that there was some force in this observation, he had determined not to volunteer any opinions on tactical questions until he was asked to do so.

* In the Discussion which followed the reading of Capt. McClernand's paper (See p. 509) before the Branch of the M. S. I., at Vancouver Barracks.

Major James Jackson, 2d Cavalry, U. S. A.

Experience in actual warfare suggests to me what are, I think, some objectionable features in the "battle tactics" developed this evening. The mechanical accuracy of the intervals, the relation of the various parts to the firing line, and consequent necessity for uninterrupted observation and communication to reinforce this line and make good its fighting strength, presuppose an open country and undepleted organizations.

There were occasions during the late War when the fighting was in such dense growth of timber and underbrush that the "firing line"—here placed at 150 yards from the first supports—could not have been seen, nor its losses known to the "first reserves," much less to the regimental and battalion commanders. At the battle of the Weldon Railroad a portion of the line of battle ordered to fall back to an intrenched line not over 150 yards to the rear, found this line occupied by the enemy. The undergrowth was so dense that neither party was aware of the presence of the other until they came in collision. I allude to this to show the kind of country it is sometimes necessary to operate in and where in my opinion the tactics explained this evening could not or would not be used.

These tactics seem also to contemplate a full complement of officers and men to the units of organization to make them entirely efficient. After war is once entered upon and a few battles fought, battalions will be so depleted that "platoons" will be insignificant in size and frequently without commissioned commanders. Regiments will be so reduced and officers so few in number that the relation of all the parts of this formation cannot be kept up. Examples were frequent during the Civil War of regiments reduced to an enlisted strength of from 150 to 200 men, with only three or four commissioned officers left. With such depleted organizations, the use of these battle tactics, depending as they do upon the intelligent and efficient co-operation of the chiefs and commanders of platoons, companies and battalions, would be imprudent if not impracticable. Advancing to attack, under these tactics, is, from the relation of the parts, a virtual attack *in open column* and when the skirmishers become well engaged, a large part of the column is within the "dangerous" zone of modern small arms and artillery and the fire failing to take effect upon the "firing line" becomes destructive to the reserves; of course, when not attacking the "reserves" would take cover, if cover was to be had, but this is not possible in advancing. The range and precision of modern small arms seem to have convinced military writers that attacks in column are no longer practicable and can only result in an unnecessary waste of strength. It is believed that the fighting of the future will be in the most open order consistent with strength and cohesion, and will probably be by successive skirmish lines making "rushes" and temporarily intrenching when ground is gained.

Battle tactics which are not adaptable to all conditions of terrain and the varying strength of organizations cannot come into general use, but it is possible that the tactics explained this evening, and which have been studiously thought out and intelligently elaborated, may find their occasions of usefulness. It is well to discuss the subject and exhaust our ingenuity upon it, for it is most important, but I believe that every battle-field will require tactics adapted to its peculiar physical conformation, the strength and condition of the battalions engaged and the composition of the respective forces.

Major Garrett J. Lydecker, Corps of Engineers, U. S. A.

It is a question whether Major Jackson's criticism would not apply with equal force to almost any other system that might be proposed for consideration, yet we must determine upon *some* system in advance of its practical application in war; to this

end careful study should be made of the fundamental merits and demerits of such systems as may be presented by any intelligent student of the subject. Whatever system, or "normal order of battle," be finally adopted as the best theoretically, must be modified in actual war to meet the special conditions and difficulties as we find them on each field of battle; this must be left to the judgment of the commanders and the field, but they should have some well defined and generally accepted "normal order" to start from and come back to—some general principle of action to guide them—admitting that the commander might experience no little trouble in adapting any systematic order of battle to such a field as the "*Wilderness*," it is also quite certain that the student will find it equally difficult—if not absolutely hopeless—to reverse the operation, and develop from the special dispositions appropriate to such a field, a typical or general "order of battle," which shall be susceptible of application in principle to every field.

Captain William E. Birkhimer, A. J. A., U. S. A.

Captain Birkhimer remarked that the tactical principle advocated by the lecturer, of having each organization furnish its own firing-line, supports and reserves, as distinguished from former method of having first one organization in a line of skirmishers, with independent commands in support and again in reserve, seemed to be an improvement. It had the advantage of maintaining one officer in command from front to rear, in the respective tactical bodies, commencing with the company and ending, in this lecture, with the division. This must lead to unity, as opposed under former practice to dispersion of the bodies of troops under any single commander, and it would seem, was advantageous.

The lecturer had spoken of our present infantry organization as obsolete. Now he begged leave to differ from him on that point. He had given considerable attention to this matter, for years, and he had come to the conclusion that, no matter what organization for infantry regiments the situation of foreign countries forced on them, the same conditions he did not believe called for these new organizations here, but on the contrary, pointed to the present regimental organization as the best one for our infantry regiments. In the War of 1812 we tried the plan to a limited extent of having Regular regiments composed of more than one battalion, so organized by law, but the experiment was not a success. The organization which weathered the storm was the ten company regiment and it was adopted as the peace organization in 1815. He did not remember and does not believe that we repeated the several battalion schemes for infantry regiments in the War with Mexico, but we did in the case of the new infantry regiments organized in 1861. We all know the result. After a great flourish of trumpets, the three battalion scheme failed practically. And that war should have taught us what we can do and what we *cannot* do, in regard to military matter in all its branches.

The truth is, in this country, the theory that we should have an expanding system for the organization of the Regular Army, so that the twenty-five thousand men of the peaceful to-day may in the war-like to-morrow become two hundred thousand regulars or any like that large number, seems to be fundamentally vicious, as well as opposed to all our experience. The fact is, the expanding scheme does not work; the small Regular Army does not, and in times of war never has expanded. There are several reasons for this. First, during war, although we make use of all our Regular officers, but principally on detached service, the men who go out to fight—the great mass of them—go into the volunteers. The volunteer regiments do the expanding which the peace theory mentioned assigns to the Regular Army. The volunteers go to war alongside of their friends and neighbors. They do not seek the ranks of the Regular Army.

There is another reason for this. The one power in this country is the political. Politicians want to command these new volunteer regiments and they do command them. Now, he would rather see these men commanding a small regiment than a large one, one thousand men rather than three thousand, as they would do if we abandon our present and adopt the plan of three battalions proposed by the lecturer. Regular officers who understand the command and control of men might be had for the command of brigades, of three of these smaller regiments, he has some statistics, taken from the official records, which bear upon what he had said: they show that, during the War of 1812, the Mexican War and the Civil War, the Regular infantry regiments had not more than a small fraction on the average of their strength authorized by law, and this, too, where they happened to be located so that they were not depleted by the casualties of campaign. Now this shows that, as a practical fact, the Volunteer does not seek the Regular Army in time of war. Why then favor the setting on foot for peace an organization which all experience shows us will disappoint the expectations of its projectors in time of war? The small regiment of to-day, with one thousand bayonets, is a compact effective organization, which can well serve as a model for the volunteer organizations, commanded as the latter generally will be by inexperienced officers. Therefore he thought it is not obsolete in fact or theory and should be retained for our Service.

Captain E. J. McClernand, 2d Cavalry, U. S. A.

As stated by Colonel Anderson, General Upton, after an exhaustive study of the principal armies of the world, decided in favor of infantry battalions of four companies each. His great ability, and the favorable opportunities he had to gather information on this subject, should give his opinions great weight. I am not aware that General Upton left any written battle tactics, beyond some formations for the company, which differ materially from those presented this evening. From what he did leave, however, I am satisfied that the general principles he intended to introduce would have been similar to those I have set forth, which, indeed, resemble those adopted by the great military Powers of Continental Europe.

The increased depth of the new formation will require the rear reserves to move over a greater distance than in the old, if a change of front becomes necessary, but the contents of my paper, together with what I shall state further on will, I think, make it clear that such depth is necessary. Being divided into comparatively small bodies, the reserves will be able to move with greater facility than was possible when massed in close and deep columns. But we must not overlook the fact that a general who permits himself to be placed in a position where a change of front must be made under the fire of the breech-loader, has allowed himself to be placed at such great disadvantage as to almost eliminate any reasonable hope of success. In former wars we hear much of changes of front made in full view of the enemy, but the troops engaged therein were not subjected to the murderous fire they would encounter in a like movement to-day. The range and accuracy of the modern fire-arm precludes extensive manoeuvring on the battle-field, especially when the enemy cannot be brought under a similarly heavy fire.

In reply to the remarks of Major Jackson, I invite attention to the fact that the long range of the rifle of to-day brings contending forces within the danger space at distances greatly beyond those which existed in former wars, even in our last one. To place more men on the firing line than can do effective work at the long ranges, would simply cause unnecessary loss. In several parts of the paper under discussion stress has been laid on the importance of making the distances between the successive lines vary with the inequalities of the ground, so as to take advantage of any convenient

cover. If the country be open, it is directed that the company supports remain with the company reserves until the firing line is one thousand yards from the enemy; this places the support three hundred and fifty yards in rear of that line, and will remove it beyond the danger space of the fire directed at the first line, for it has been discovered that the extreme probable limits of such space resulting from an infantry fire directed at a distance estimated at fifteen hundred yards will be four hundred yards. Such distances, of course, will vary with the change of small-arms. If the country be close, the support should take advantage of it and move nearer the firing line. When the latter has closed to a thousand yards from the enemy, the support, even in an open country, must draw closer to it; in order to give prompt assistance to the front, to make or to meet a flank attack, and to afford moral support. As men begin to fall at long distances from the enemy, there should be reinforcements conveniently posted from which to draw material to replace these losses, and to give confidence to the men on the firing line, who would doubtless become discouraged if compelled to advance from one-quarter to half a mile under a constantly increasing fire without the moral support derived from knowing that assistance was close at hand. Again, the regimental and divisional reserves must be placed far enough to the rear to arrest the usual tendency to call prematurely for heavy reinforcements, as well as to afford these reserves every opportunity to seek cover.

To avoid unnecessary exposure they should not be brought much nearer than two thousand yards from the firing line; and to be ready to give reasonably prompt assistance, they cannot be posted much farther away.

Whatever might be the merit of the tactics I have here presented, if tried under the conditions mentioned by Major Jackson as having existed at the battle of the Weldon Railroad, it is clear that those in use during the Civil War, and which, to the Major, seem nearly or quite perfect, were not equal to this particular occasion, for by his own statement the enemy established himself one hundred and fifty yards in rear of the troops, on the line of battle, without their knowledge.

Let me repeat, that in a very close country the distances between the lines can be advantageously reduced.

If these tactics presuppose five officers to a company two hundred strong, those now in use assume three officers to one one hundred strong. I admit that the effectiveness of one of my battalions would be greatly impaired if reduced correspondingly to the regiment mentioned as having but one hundred and fifty enlisted men and three or four officers. This is no test of the relative merits of the two systems, for it is a well-known fact that the usefulness of many of the regiments during the Civil War was almost wholly destroyed by such depletion.

When the skirmishers become well engaged, the danger to the rear *échelons* should become less instead of greater, as has been suggested by one gentleman, for the enemy's fire may then be supposed to be aimed with considerable accuracy at the firing line.

With the old weapon, the main reserve might stand in one line at a comparatively short distance in rear of the skirmishers, which, as I understand it, is the Major's plan. Then few men were disabled beyond what may be considered short range today. Under those conditions the reserve arrived sufficiently near to the enemy to do effective work with its formation fairly intact, that is, before it suffered much loss. This, however, cannot be expected now, when an infantry fire directed at large bodies of troops can be made destructive at fifteen hundred yards. His "successive skirmish lines," although bearing another name, will probably not differ much from the lines I have mentioned. That temporary intrenchments should be made, when practicable, if the line can advance no farther, is undoubtedly true; but it is not clear why the

successive lines mentioned in the paper cannot accomplish this as well as the suggested "successive skirmish lines." This idea was in view when it was recommended that the men be taught how to utilize houses and fences for cover. To these I will add logs and earth. Field intrenchments, like fire-tactics, might properly be classed with battle tactics, but the limits of my paper would not permit of their being treated in detail.

Captain Birkhimer offers two objections to the battalion organization which has been suggested. In the first place, he disapproves of what he terms the "expanding system" of such an organization, and adds that we must rely on volunteers to do the expanding, and that they will not elect to enlist in a Regular regiment. I admit all he says about the volunteers, but why should more difficulty be experienced in expanding a battalion of four companies from a peace to a war footing (increasing the companies say from one hundred to two hundred men), than in a similar expansion of a ten-company regiment? Certainly no one will advocate sending our Army, as at present organized, into the field without such expansion, or increase of company strength. The battalion organization is for the National Guard and Volunteer, as well as for the Regular. His second objection is that political influence will cause inexperienced men to be appointed colonels, and infers that with our present organization Regular officers might be selected to command brigades. I submit that our experience does not justify us in believing that many Regulars will be selected, and the captain says our last "War should have taught us what we can and what we cannot do." If there is to be any improvement in this direction, we may reasonably hope that it will be in satisfying the inexperienced man by giving him the three-battalion regiment, and thus reserve the higher command for the educated soldier.

It has been stated that in the Mexican and Civil Wars the regular regiments had not, on an average, more than a small fraction of their authorized strength. To this I reply, no war ever saw a more vicious system for recruiting than the War of the Rebellion. Its evils are well known to every one. When recruits were wanted, old regiments were not filled up, but new ones created. If we go into another war with such a system, we must expect to pay for it in an unnecessarily large expenditure of blood and money. Let us be wise, and organize at once for each regiment, or battalion, as it may be, of the Regular Army and National Guard, a depot company, or companies, to enlist, instruct, and send our recruits to the front in a business-like manner.

II.

"Place of the Medical Department in the Army."

Brevet Maj-Gen. Wesley Merritt, Brig-Gen. U. S. A.

MR. CHAIRMAN: I have listened with great interest to Colonel Woodhull's excellent paper and am constrained to say that his arguments for giving medical officers their military titles are most convincing. There is no staff corps which is as intimately associated with officers of the line, both in time of war and in peace as is the Medical Department. In my experience there is none which has excited more admiration among the fighting men of the Army than this. In times of danger they are always to the fore, whether it be pestilence or battle that threatens. In times of peace they are our pleasant cultivated companions and every officer of the line counts association with this staff department to his advantage. As a commanding officer, whether of a post or a department, I have always paid close attention to the sanitary reports of the members of the Medical Department and have profited by the practice, and feel sure the Service has been much the gainer by the wise suggestions in these as well as in other matters by the medical officers.

The neglect to give them their proper military titles results from habit rather than design. I for one am willing to be cured of the habit, and I take it the paper we have just heard read is a sovereign remedy. I fear however, as has been suggested, that we will find that the "doctors disagree" in this, as sometimes, in other matters. However, I for one promise, that though I consider the professional designation a highly honorable one, I will cheerfully give the military title when I am sure it is personally desirable.

III.

"Outline of a Manual of Infantry Drill."

First Lieut. George Andrews, Adjt. 25th Infantry.

COLONEL HAWKINS in his outline furnished the essential features of his system and thus presents, as Professor Michie remarked: "An individual solution of the problem offered for our unsparing but honest criticism."

It may be said that so far as the great military Powers of the Continent are concerned, the infantry problem has, since 1886, reached a practical solution and that few important changes may be expected until after another war, except where new appliances, such as smokeless powder, introduce new factors.

Some of the works quoted by Colonel Hawkins were written before this solution was reached, hence they are not altogether applicable to present conditions, for example: the terms loose, individual or dispersed order, have in English been replaced by extended order, which conveys no suggestion of looseness, dispersion or independence; a clear distinction has been drawn between skirmish order and the formation of the fighting line; the individual system has been replaced by the group system; the group, which was the key to the solution of the problem, becomes the basis of the attack formation, maintains control and cohesion up to the latest possible moment and even enables units to mingle without mixing; this system has set at rest certain questions regarding the possibility of approach in close order and the formation and action of supports and reserves, by enabling each fraction, whatever its position, to take the formation best adapted for the time being to its particular necessities.

The unanimous verdict in favor of a system of drill and organization has also quieted, for the present, discussion upon many other points, of more or less importance, which attracted considerable attention previous to the epoch referred to. The military mind now seems occupied in studying the accepted system.

As every one knows, the Continental army organization is based on a company of 250 men, four companies to a battalion and three battalions to a regiment. For action the isolated company is divided into firing line, supports and reserve, but when in battalion into firing line and supports only, the reserve being composed of entire companies. The battalion is the smallest unit which always has a reserve; the regiment and brigade may be formed in two or three lines—always in three lines when operating alone; the division is always formed in three lines. The first line consists of the firing line and supports (fighting line proper), and the reserves; the second line of the reserve battalions; the third line constitutes the general reserve. The main body, so called, has disappeared, because the principles of sufficient force leave it no fixed place; the principle that the fighting line proper should consist of entire units (companies), taken in connection with the requirements of sufficient force, dictated the abolishment, noted above, of company reserves when in battalion. The general commander makes known his plans and retains the general reserve under his own control; subordinate commanders conduct the action much as they would if their units were independent, but

always working in harmony with adjacent fractions ; every officer, within his own sphere is expected to take the initiative when necessary to further the general plan.

Colonel Home is quoted (page 360) as endorsing the Prussian system of four battalions ; he admits that a company of 250 men can be influenced by one man, and reasons that as 1000 men is the proper limit for a battalion, four of these companies is correct. He considers that the size of the company should be considerably reduced (the English battalion is eight companies of about 100 men), but one of his reasons is of no effect now that the three-deep formation is abolished.

Conceding that the Prussian company was mainly the result of economical motives does not disprove that it is continued for its tactical advantages. The large company is through thorough training of officers, non-commissioned officers and men, readily controlled by the mounted captain ; it is an excellent unit for out-post and other semi-independent duties ; since it can maintain a firing line, support and reserve, each of considerable strength in the beginning, while a desperate effort of its entire effective might, from a favorable position, hold a considerable force in check ; when fighting in battalion the mixing of different units is delayed and may sometimes be avoided by the abundant resources of the fighting line ; moreover the company feeling of unity and confidence would naturally be in direct ratio to its numbers.

In any considerable war, we must rely upon the intelligence, fertility of resource and adaptability of the people, not upon the military training of the masses ; in the organization of the company it is particularly necessary for us to take advantage of natural tendencies and avoid running counter to them ; one such tendency is to divide into small groups each under an appointed head, for the carrying on of all commercial enterprises which employ as many as a hundred men—therefore the company should be divided into small squads on the group system. Generals are born, not made, they say, but as we descend in the scale, leaders multiply and we may reasonably expect to find for every eight men one who, with backing and some instruction would lead his squad “ even to the cannon’s mouth.” A mob is the extreme illustration of individual organization—the application of the group system transforms it into troops.

We generally favor the twelve company regiment, in which a battalion is four companies—400 men, a regiment 1200 ; the regiment is the unit of administration and command because the so-called battalion has no staff to carry on the work of either. Now the proposed regiment exceeds by 200 the limit set by all authorities for the strength of a battalion and falls short of the strength of a three-battalion regiment by 1800 men, still our proposed battalion commanded by a major would bear some resemblance to a Prussian company with its mounted captain and could be used much in the same way.

Colonel Hawkins claims that his system offers advantages over our present one in the following particulars : 1. The greater rapidity with which a company can fall in, deploy and commence firing. 2. Deployment of skirmishers from line or column. 3. Leg and elbow room in marching. 4. Deployment as skirmishers, execution of the march and stack arms without counting fours. 5. Lying down in line or column. 6. In firing the rear rank man has an interval to fire through. 7. Extension of the front from touch of elbow to any desired front. 8. When extended the company can fire lying down, by file, by company or by rank. 9. Formation for street fighting. 10. Dividing the column of route so as to leave the roadway free. It is proposed to prove that all these advantages are quite as easily obtained from our present double rank formation, in other words, that they are not inherent in Col. Hawkins’ system.

By providing for taking intervals between files and distances between ranks, the double rank affords the advantages numbered 3, 5, 6, 7 and 8. The principles of forming line from column of fours (Upton, paragraphs 224 to 228), are readily applicable to

forming line as skirmishers, as in No. 2. By dividing each platoon into two sections we obtain four sub-divisions which can be disposed precisely as in No. 9, if desired, and our present column of fours can be divided as in No. 10.

To meet advantage No. 1, suppose the men rally in double rank faced to the front, without regard to regular places; in deploying as skirmishers the instructor selects any file as a base, this file moves in the direction indicated, the files to the right and left of the base oblique respectively to the right and left until each gains the necessary interval, then the rear rank man places himself in the interval on the right of his file leader; being at a halt the base file stands fast and intervals are taken by the flank. This is simpler and quicker than Col. Hawkins' method and no word of command is necessary.

To obtain advantage No. 4, brings us to the group system, in which each set of four is a permanent squad of the company, composed of a corporal and seven men; when the company assembles, these squads form as is now prescribed for the sections of a field battery; there is no need of counting fours, each man *sees* his relative position just as he does in the four-deep formation, and column of fours can be formed or arms stacked at once.

So far as the advantages stated are concerned there appears to be no reason for adopting the four-deep formation, but it is still necessary to examine the formation itself, the employment of the ranks and the methods of deployment with reference to the advantages gained in control and fire-discipline.

Each rank is regarded as a group (page 368), but since the platoons are also groups (page 373), we observe that the dividing lines run both parallel to the front and perpendicular to it; therefore detaching a platoon breaks the rank-groups into halves and detaching a rank may leave a platoon without its chief; this duplex method of grouping leads to uncertainty or confusion. The distance between ranks is habitually so great as to materially diminish the effect of the fileclosers, who can expect but little aid from the corporals who are posted on the flanks where they have the least influence as factors of control and steadiness. The normal formation does not admit of firing, which suggests the thought that it is abnormal.

The moment a rank is detached or deployed it becomes a skirmish line—the most inflexible of formations and the most difficult of control; there is no deployment by groups in which the groups take intervals while the individuals in each group keep in close order. The ranks must oblique or march by the flank in single file, in gaining their positions; there is too much unmasking to be done before fire can be opened by the ranks in rear; the advance by rushes would be extremely dangerous without intervals between ranks, especially as the ranks in rear advance beyond those firing in front. The retreat by rushes is a feature which has generally been condemned, it being better for the whole company to retire from point to point, making its stands and delivering its fire together.

The necessity for moving on certain designated points is clear, but since every rank may have to oblique or march by the flank before it can take its line of direction, it is possible that the point may not be in view from the new position. It is, of course, necessary to designate the point before the deployment is begun. As the officers and sergeants take their places in the ranks at the preparatory command for deploying they can make no effort at leadership until the ranks have disengaged so as to afford room for them to place themselves in front of their men.

In the deployment forward spreading from the centre, the first rank lengthens the step and the second rank shortens it, to prevent the ranks from interfering previous to disengaging, while the halt is still necessary to enable the fourth rank to arrive on the line; the third rank is really the base of the movement although in rear of the second

until after disengaged. The deployments spreading to the right or left are not subject to this objection because the base rank is always in lead, but should it be halted before it has moved forward company distance the other ranks would have to modify the length of the step, as noted in the former case, or resort to the flank march. The object in view is to deploy in the simplest and quickest manner; therefore the base group should always be in lead and advance in quick time in the direction indicated, while the subordinate groups move in double time by the shortest lines to their positions, a method that removes all uncertainty as to gaits and renders the command *double time* as unnecessary to the commencement of the movement as is *halt* to its completion.

In the flank deployments from normal line, the first, or leading, rank is the base where the movement is executed toward but one flank; why not make it the base in the deployment by both flanks? The second rank would then deploy by the right flank, the third and fourth ranks by the left.

In the deployment from column of route, it is observed that the deployment right (or left) front into line, throws only one more rank to the right (or left) than is done by the deployment on the centre; it would seem that in the former movement the left (or right) rank should be the base in order to obtain the greatest amount of lateral extension.

Reinforcing by successive lines of skirmishers has the objection of strengthening points already overcrowded as well as those which are thinned out—a fault which can only be met by the group system.

In assembling, the company may form in column of route (page 363) or in normal line (page 366), though how to determine the method to be used in a particular case is not explained; it is clear, however, that there is no invariable assembly formation (the rally is but a rapid assembly), which is a grave error.

The proposition to rally in column of route (pages 371 and 374) on ground just wrested from the enemy seems against all human tendency and equally against the principles of securing the position; the company is confessedly “prepared for orderly manœuvre” but this is not expected at this juncture—“a heavy fire should be poured on the enemy as he retires.” To form the company in column, faced to a flank, not only prevents a rapid formation and the possibility of instant fire but implies that a flank march usually follows the occupation, which is absurd.

The captain should, indeed be the rallying point and when he calls, the men should run to him by the shortest line and form successively as they arrive on the nearest flank. There is nothing artificial in assembling in line—cavalry horses have done it without their riders.

In conclusion, it should be noted that the four-deep, or checker, formation is not distinctively American, Col. J. H. A. Macdonald of the British Volunteers ably advocated its merits in several publications some years since and had the merits of the system tested at manœuvres in England. It compared favorably with more ancient methods perhaps, but was not incorporated in the English Infantry Drill of 1889.

IV.

"A Regimental Court of Honor."*

Capt. W. E. Birkhimer, A. J. A.

THE importance of maintaining a high tone of honor among our officers cannot be overestimated; it is absolutely necessary. It is this which distinguishes that class in the community, and the preservation of it unimpaired will alone retain to officers the respect and confidence of the country. Nor, be it happily said, has experience everywhere led to the belief that this "important factor in an officer's and therefore in the Army's efficiency is being allowed to suffer from neglect, indeed, go by default." Doubtless circumstances arise occasionally which give color to such melancholy reflections. In every community and in every profession there doubtless will be found unworthy members. To expect that the Army will be an exception to this rule would be unreasonable. The best matured system for securing proper appointments is liable to abuse. Materiel originally good may deteriorate. It is possible that unworthy men may be forced into the commissioned ranks of the Army, and, spite of all that can be done to rid the Army of them, they may be kept there. But should such cases ever happen, they will be few and far between. Why cannot the community upon which they are forced, if forced they ever are upon the community, take care of such cases? Certainly no one is compelled to associate socially with them. If such people are treated as they deserve to be, there is no danger to the "honor of the brotherhood of officers" from this or kindred sources. If the mass be good to start with, it will not be polluted in this way.

It is not believed that war fosters universally, or that peace invariably and insensibly impairs, the "honor of the brotherhood." War certainly does develop the noblest traits of human nature; but also its worst. In war the best and basest elements are thrown up to the surface. It takes a long course of purification to purge the system of the deleterious elements. The year 1870 will long be remembered on account of the good work in this direction then done.

If the idea be advanced of having a court of honor, similar to that in Germany, established in our Service, by law, for each regiment, it is not believed that the scheme is practicable. Our legislators do not look kindly on such measures. They have provided means which seem to them sufficient to guard the honor of the military profession. The instrumentalities for giving effect to these means are in the hands of the officers themselves. "Why," they will ask, "do you not make use of weapons already at your hand, instead of asking for others to maintain the honor of the brotherhood? If we should give you increased facilities in this regard, what assurance have we that you will use them to better purpose than you have those you are already entrusted with?" And when the legislators talk and reason thus, what reply can be made? Those would have to make it who favor asking for such legislation, and have faith in its efficacy. Again, it must be remembered that when an officer goes out of the Army, in the manner indicated, in the German and kindred services, he goes to stay. Here he comes back if he so desires, and has sufficient political backing. Is any one dreamy enough to imagine the day is near when political influence will not accomplish this? If so, that person has different notions from some others, who think that the *political* is the only *power* in this country worthy of that name, and it grows stronger apace instead of weaker? What effect upon the workings of the regimental court of honor would this returning to their old positions of officers have, who had been justly punished by the court? Manifestly it would greatly impair the efficacy of that system, just as it now does that of the court-martial.

* See "A Regimental Court of Honor," JOURNAL, M. S. I., No. 44.

How much better would we be off with the regimental court of honor added to the court-martial we now have, than we are with the latter alone? It is not seen how we would be better off with the two than we are with the one.

If it be a sad fact that "the honor of the brotherhood of officers" is being allowed to suffer from neglect, relief can come only from one of two sources, namely, either from without or from within. If from without, it can only be through legislation as before indicated, and this, it has been shown is impracticable; and it is believed to be equally undesirable.

But how about purification from within? This is the only source whence improvement can reasonably be expected to come.

And first, let it be understood once for all, that expectation that unworthy members of the brotherhood will not occasionally be bolstered up by family or political influence to the disgrace of the profession need not be indulged. It is plainly Utopian. No matter how high toned the sense of honor of the brotherhood as a general thing may be, there will thus be sometimes introduced and retained in office those who discredit their cloth.

Taking it for granted, therefore, that these cases are beyond the power of the brotherhood to obviate, however much they impair its credit, particularly with the outside world, let us see if the brotherhood itself cannot, if it be so disposed, remedy the evil indicated, if indeed it exist.

The main points to be looked to are these: first, permit none but first-class (*sic*) gentlemen to receive commissions: second, make them keep up to the same high standard while they retain them. It seems that nearly this whole matter is in the hands of the officers themselves. They admit recruits into their ranks. Excepting a few staff appointees no one receives a commission until his mental and physical condition, moral character and educational attainments have been passed upon by the brotherhood (see Act, June 18, 1878, and G. O. Nos. 5 and 6, A. G. O., 1890 and pars. 23 et seq. A. R.). After he is admitted, the Articles of War and the Army Regulations put into the hands of that same brotherhood the means of keeping him (and to this there is no exception) up in all respects to the same standard of excellence. If, therefore, those are either admitted (except these few staff appointees) or retained whose influence is detrimental to the honor of the corps of officers, who is to blame except the members of that corps? They have the means for getting rid of them, *if they have the nerve*. It is believed, therefore, that the remedy for any evils that may exist, in the direction indicated, is simple, and is this: more care in selecting those who are to be honored with commissions, and, what is more important, increased determination on the part of officers that, to retain those commissions, the holders must show, at all times, that they remain worthy to retain them.

Commissioned officers enter the Army through West Point, promotions from the ranks of the Army, and selections from young civilians. A great majority, in time of peace particularly, come in from the first mentioned source. Fortunately, the professors and instructors at that institution have a just appreciation of their duties, and their obligations to the country. The cadet, subjected to four years of severe mental, moral and physical discipline, comes out of that school, as a rule, so moulded and tempered for his work in the Army that decadence of the honor of the brotherhood of officers will rarely be laid at his door. There are three simple rules to guide officers in their relations with others the observance of which will never permit them to go astray. (1). Speak the truth, though the heavens fall. (2). Obey orders promptly and cheerfully—appealing afterwards if desired. (3). Do to others as you would wish them to do to you. These are not all the virtues to be practised, but from them most others, including proper punctilio, and a high sense of honor, will be found to flow.

With regard to the first two of these three rules, the West Point course of instruction is admirably intended to impress them deep upon the minds of the embryo officers. To lie, there, is the unpardonable sin. And so deeply is this love of truth implanted in the breast of cadets (as a very general rule), that their statements of fact can be implicitly relied upon. This may seem to some people, and to the young gentlemen themselves at first, a matter of not so much importance after all. But ask the old officer, he who has had for years to rely, to a great extent, upon the representations of subordinates, if its importance can possibly be overestimated. He will say that the simple rule, "Speak the truth," is the cardinal military virtue.

The course of discipline there is well calculated to add that other virtue—cheerful obedience of orders. The graduated cadet can generally say, "not my will, but thine be done" to his superior officer, and take great pride in saying it with good grace, and without mental reservation. He takes a peculiar satisfaction in doing what his superiors order, not because he does not like as well as others to have his own way, but because the discipline of the soldier, woven into his fibre, teaches him it is his duty to obey—therefore it is his pleasure.

The third of these rules is not pointedly inculcated at West Point, nor is it anywhere else in the military service. It is one of those moral virtues, based on goodness of heart principally, consideration for others, the very opposite of selfishness, which selfishness military life is calculated, most unfortunately, to develop. But it is one of the virtues that officers should try to cultivate, each in his own breast. Joined to the other two it will make the officer who practices it respected and beloved by his associates. And *honor* is not likely to depreciate if each member of any brotherhood is respected and beloved by the others, and of these, the *respect* of others is the more important.

There are some, I will not say a class, whose sense of honor never rises above the standard of the barracks. It should be about as difficult for them to get a foothold among gentlemen as for a camel to go through the eye of a needle, literally speaking. Though many of this kind are called, let few be chosen. Their influence, insignificant though it be, is detrimental, so far as it goes, to a cultivation of a fine sense of honor.

Civilian appointees will receive impressions from, and, as a general thing, naturally enough, act up to the standard of honor set by those whom they find already in the Service.

Upon the whole it seems, after carefully reviewing the military situation, that, if the corps of officers will only make use of those means now provided, they can maintain the honor of the brotherhood at a proper standard, or redeem it if they have incautiously permitted it to be lowered. If they will not make use of these instrumentalities, what inference can be drawn but that they do not wish to maintain it at a high standard, or do not want it raised when it has thus been cast down.

But in any event, it is not perceived how the addition of the Regimental Court of Honor will be an improvement over the existing system.

Bvt. Lieut.-Col. A. A. Woodhull, Medical Department.

All practical methods of improving the tone of any community, civil or military are to be encouraged. But the meaning of honor differs with every grade in society, from the questionable variety that is said to be found among thieves to the quixotic sort that resents with a bullet a word spoken in jest. To my mind the best definition of military honor is that quoted by the writer from the German Emperor (p. 414). Such honor is not concerned with empty forms, but with the conscientious discharge of duty at all

times and under all circumstances, and with constant personal dignity, not with an artificial formalism. I doubt, however, whether the Honor courts concern themselves as much with failures to meet that standard as with violations of codes more or less factitious.

I cordially agree with Lieutenant Wills, that with us there is too little regard for what may be called the unofficial observance of official etiquette. That is, that officers too freely and unguardedly express opinions of other officers in ways likely to weaken the respect and authority in which they should be held. This is not merely true of juniors discussing seniors among themselves, but of seniors in relation to juniors before those who may perhaps be junior to the one criticised. Every one may properly have his personal opinion of men and measures, but such opinions should only be expressed with caution and never so as to weaken authority. Commanding as well as subordinate officers sometimes sin in this way: who then shall keep the keepers? Undignified or reproachful reference to commissioned officers, not to, but in the presence of, enlisted men is a serious blemish in garrison life. A court of honor could hardly deal with such cases without making more mischief, and the real remedy is greater personal dignity and a more wholesome altruism in the speaker. This in confirmation of Lieutenant Wills' remarks about our looseness of speech (p. 418) is, however, merely by the way.

I think that courts having such functions as proposed would be impracticable in this country. Commissions in a republican and in a royal army represent different service and are held by somewhat different tenures; not that our dignity and honor should be a whit less than theirs. Congress would never authorize, nor would the Army at large accept with equanimity a second tribunal charged with judicial functions and with punitive powers. The office of such a court with us, if authorized, would be less the protection of an officer from insult, that is as a substitute for the duel or for more informal conflict, than to act as a censor upon conduct below caste for a sensitive community. It is not necessary to cite examples. Doubtless in theory a fearless, alert and delicate court of this character would be invaluable. But, as just said, our institutions could find no place for it, and admitting the possibility of its legal existence it would be practically impotent. Insuperable obstacles are our small garrisons, the risk of prejudice and clique, and above all the divergent views of many officers upon points not involving infraction of law or morals. The very difficulty to be corrected, laudable as is the effort, would probably weaken the court.

This varying standard results from the wide social scale through which appointments are made, and the absence of a common training whose uniform pressure would more nearly reduce to a common mould. It would be much better to have no formal expression of opinion than that such a court should indorse or condone a doubtful transaction or one repugnant to a delicate sense.

Were our colonels more fortunate in having their regiments together, and were they all men of such personal example and force of character as by private admonition, or, if necessary, by public reprimand, would hold the reins of decorum tightly drawn, great good might be accomplished. The same in theory should be the status of post and in turn of others, superior and inferior commanders. But here the original trouble recurs and we find ourselves inclosed by a chain with some very weak links.

Beyond the careful cultivation of personal and regimental tone by the milder influences of precept and example, the only although somewhat hazardous remedy, except courts-martial, seems to be for public spirited officers to take individual cases into their own hands. Practically this is a resort to moral vigilance committees. Each case where a vigilance committee is to be preferred to due process of law, is to be decided upon its own merits.

Reviews and Exchanges.

Hand-book of Problems in Exterior Ballistics.*

IN this work Captain James M. Ingalls, 1st Artillery, supplies us with an invaluable treatise on the subject of Exterior Ballistics. Part I., just distributed among the Artillery Arm, covers direct fire, and deals with the solution of problems in this important branch of gunnery. Each problem is solved in general terms, and then illustrated by one or more practical examples in a manner so clear and simple that no artillerist can longer find an excuse for remaining ignorant of the subject. This treatment by practical examples relieves one from the alternative of memorizing long and laborious processes, or wasting much time in relearning them when once more required. The method of obtaining the ballistic constants is so plainly outlined, that for a given gun and conditions their determination becomes a simple matter. A few well-conducted experiments will furnish the necessary data. Under the head of small arms many useful tables are found, and much valuable information relating to the military rifle of the future. This part of the book cannot fail to recommend itself strongly to those interested in this subject. One of the distinctive features of the book is the application of the laws of probabilities to the computation of the absolute accuracy of a gun. We believe this will be of great advantage to gunnery, and will ultimately reduce it to a fine art. The application of least squares, and like methods, to the reduction of ballistic problems is a step towards their higher treatment, and will, without doubt, elevate artillery work to a plane where the scientist and mathematician will play more prominent parts than ever before. Little by little we notice the growing demand for accuracy. To obtain this, all deviating elements must be considered, and corrective allowances made for them. This sentiment manifestly pervades the Hand-book of Problems, where all the elements affecting the flight of a projectile are discussed. Here we find wind, drift, changes in atmospheric temperature and pressure, with the most recent and best methods of computing the values of each in solving a trajectory. In future wars, where the struggle may be to the death, and each antagonist striving for the first fatal shot, none of these apparently unimportant agencies can be neglected. Evidently the author has this view in mind; and although some of the formulas fail to inspire the confidence which practical experience and proof alone can give, they will be of great value in forming a ground-work for further and deeper analysis. In this book a wider view of the subject is taken than that of a collection of "rules of thumb," to be used in the approximate solution of independent and isolated problems, and ballistics begins to assume the form of a science in which the component parts hold certain definite and dependent relations to each other and to the whole. We believe that progress in this department will be great in proportion to an approach to this conception, and that the sooner this idea is firmly grasped the sooner indifference will disappear and be replaced by systematic courses of theoretical and practical investigation.

* *Hand-book of Problems in Exterior Ballistics.* By Captain James M. Ingalls, 1st Artillery. Fort Monroe Press.

The work formulates a growing sentiment, and will soon give it a firm hold upon the future, and at the same time will be an invaluable companion in our efforts to obtain a better knowledge of the principles of gunnery. We believe that the enormous labor expended on Part I. will be many times repaid in benefit to the Service, and shall anxiously await the appearance of the second part.

J. W. R.

War-Path and Bivouac.*

In "War-Path and Bivouac," Mr. John F. Finerty gives most interesting account of the two most important Indian campaigns in the history of this continent, to which are added short biographical sketches of the military history of Generals Crook and Custer. Part I. is devoted to the Big Horn and Yellowstone Expedition under General George Crook, and part II., to the campaign to the British line under General Miles. The whole book is written in a pleasing style and the history of facts occurring under the writer's eyes is more entertaining than any romance could be.

The chapter devoted to the Sibley scout is of intense interest and the following passage giving the brief instructions of Lieutenant Sibley to his men speaks eloquently of the desperate character of Indian warfare.

"Men, the Indians have discovered us. We will have to do some fighting. If we can make an honorable escape, all together, we will do it. If retreat should prove impossible, let no man surrender. Die in your tracks, because the Indians show no mercy."

In the following, the author indicates the method of the greatest Indian campaigner of our age.

"Crook is severe, and I'd rather be with Terry, as regards food, shelter and clean flannel, but he goes for the Indians as one of themselves would do, and has shown that an American army can stand without much growling or the slightest approach to mutiny more than any other troops upon this earth. * * * A large portion of the rank and file was made up of material that covered the British arms with glory in the Peninsula—the never war-absent Irish—and of Germans, whose slow bravery solidifies the Celtic ardor with Yankee coolness and makes the three elements of a military body that to use the words of a dashing American officer, who had accompanied the column from the outset, "would go with the Balaklava six hundred into the mouth of hell, and then brandish their carbines and call upon the Light Brigade to follow them and fight their way out at the other end."

Of the many fights and skirmishes engaged in and of hardships and privations undergone, Mr. Finerty speaks as one who was present through them all and his story as coming from an unprejudiced outsider renders it probably of more value than had it been written with an equally brilliant pen wielded by one who at that time was wearing the Army blue.

E. F. W.

A Catechism on Cavalry Outposts, Reconnaissance and Advance and Rear Guards.

This recent publication of Lieut. E. A. Garlington, 7th U. S. Cavalry, is a valuable acquisition to the military text-book of the trooper and one that it would be well to see in the hands of every troop commander, not only for the instruction of the men under his command, but for the individual attention of the officers. There is much to invite the attention of the cavalryman who may have had but little experience in the methods of offense and defense of a body of which he forms a component part, and

* *War-Path and Bivouac, or the Conquest of the Sioux.* Published by the author at 79 Dearborn Street, Chicago. Price, cloth, \$2 per copy.

also in view of the fact that he may be called upon at any moment in actual warfare to exercise a judgment which will be much aided by such a catechism as Lieutenant Garlington presents to us. This book has been submitted to a capable board of cavalry officers, who highly indorse it, and it has received the approval of Lieutenant Garlington's regimental commander. It would be a wise step to cause it to be placed in the hands of our cavalry officers.

Lieutenant Garlington has made a careful *résumé* of many modern writers in compiling his book, and has adapted his questions and answers to the circumstances that are liable to arise, and of which every officer and soldier should be cognizant.

J. B. H.

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- The United Service.* (May, 1890) The Military Schools of the United States. A Modern Battle-ship. Gessie Pasha. Great Commanders of Modern Times.—“Marlborough.” A Romance of a Government Coast Survey. A California Pioneer. National Guard Elections. (June, 1890) The Battle Tactics of To-day. Naval Discipline. Frederick the Great. The Trials of Staff Officers.
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Historical Sketches
of the
Army
of the
United States.

Memorandum.

THE EDITOR is authorized to announce the beginning of the serial publication of Historical Sketches of the Regiments, Staff corps and Staff departments of the Army, referred to in the Circular, Publication Committee, Nov. 10, 1889 (see page 21, front, this JOURNAL). Officers engaged in preparing such sketches are requested to advise the Editor of the progress of their work.

FOURTEENTH REGIMENT OF INFANTRY.

BY COLONEL THOMAS M. ANDERSON, U. S. A.,

FOURTEENTH INFANTRY.

WHEN one of the newly organized battalions of the Regular Brigade of the Army of the Potomac reported to Colonel Buchanan, he said to its commander: "Sir, your men look like volunteers!" The reply was: "That is just what they are." The veteran martinet rejoined, "I will make them Regulars"—and that is what he did.

This little dialogue gives the history, in brief, of the nine infantry regiments added to the Army in 1861. Nearly all the officers were appointed from civil life; the men were specially enlisted for their regiments and, generally, for designated companies by their company officers.

The War Department tried to assign as many experienced officers and as many old soldiers as possible to the new organizations, with the intent that they should act as organizers and instructors. It was hoped that enough could be assigned to leaven the mass and thus make the new regiments reasonably efficient in a short time. But out of eight West Point graduates sent to the 14th Infantry, only three went with the regiment to the field; the others were assigned to other duties; four as brigadier-generals of volunteers.

All the new organizations had about the same experience. The volunteer element was predominant, but by precept, example and environment they soon acquired the traditions and spirit of the old Army without losing the zeal, enthusiasm and resource of the volunteer soldier.

In one of the first battles of the Rebellion, an old officer watched one of the new regiments as it went forward, under a withering fire, with a cheer. The veteran smiled grimly, and said, "They act like mustangs, but they fight like men."

The 14th Infantry was organized under the President's proclamation of May 4, 1861, which was confirmed by an act of Congress of July 29th of the same year. Twice before a regiment designated as 14th Infantry had been organized in our Service. The first in the War of 1812. Besides its field officers, it had its full complement of captains, first, second and third lieutenants, its ensigns, surgeons and surgeon's mates; most of these officers were commissioned from Maryland.

Its first colonel was Wm. H. Winder, who having been appointed a brigadier-general in March, 1813, was succeeded by Col. Charles G. Boustler, who had been the first lieutenant-colonel.

The regiment in whole or in part was in the engagements at Fort Niagara, Frenchman Creek, the capture of Fort George, at Beaver Dams, Chrystler's Fields, De Cole Mill, Chippewa and Cook's Mills.

The roster of this original 14th Infantry will be given in an addenda, but there was one officer who fought under its banner, who deserves more than passing notice. Among the young ensigns of the regiment was one John A. Dix. He fought gallantly through the second war with Great Britain and did not resign from the Army until 1828. While the Mexican War was being carried on, he was a United States Senator from the State of New York. An attempt was made to have the grade of lieutenant-general established so that President Polk could appoint a political favorite to the command of the Army over General Winfield Scott. It was by the exertions of General Dix, that this partisan scheme was frustrated and that the hero of Lundy's Lane and Chippewa received the command of the Army which invaded Mexico from Vera Cruz. Fifteen years later the ex-ensign of the 14th Infantry was a member of the reconstructed cabinet of James Buchanan as Secretary of the Treasury. Just before the secession of Louisiana, information came to the Capitol, that the fire-eaters of New Orleans were threatening to pull down the National flag from over the Custom House. An answer was flashed back which thrilled the country like a bugle call. "If any man attempts to haul down the American flag, shoot him on the spot," (signed) John A. Dix. The lessons learned by the young subaltern of 1812 were not forgotten by the grey haired statesman of 1861.*

The 14th Infantry was again organized in April, 1847, under an act of Congress, passed and approved the preceding February.

The colonel was Wm. Trousdale of Tennessee. The lieutenant-colonel, Paul O. Hebert of Louisiana, a graduate of the Military Academy and a lieutenant in the Corps of Engineers. The major of the regiment, was Charles Wickliff.

With three exceptions the officers of the regiment were appointed from Louisiana and Tennessee.

As the organization of the regiment was not completed until the 9th of April, it did not join General Scott's column in time to take part in the siege of Vera Cruz or the battle of Cerro Gordo, but joined the main army at Puebla early in June, 1847. It was assigned to Cadwallader's Brigade of Pillow's Division. Their brigade consisted of the Voltigeurs, the 11th and 14th Infantry.

They took a conspicuous part in the battle of Contreras on the 19th and 20th of August. On the 19th with their brigade they held the village of Contreras from daylight until dark under the fire of Valencia's entire division, the most thorough baptism of fire new troops ever received. That night they marched through a break in the Mexican line and up a ravine that led them directly in rear of the Mexican position. When the charge was made in the morning the battle lasted seventeen minutes and the pursuit four hours. A pleasant little episode for the 14th was the repulse of a charge of lancers. From Contreras, Pillow's division hastened over to support Worth in his attack on Churubusco. The 14th participated in no less than four attacks that day. It fought also at Molino del Rey, at Chapultepec, and the storm-

*It is interesting to note, that his father, Timothy Dix, was made the lieutenant-colonel of the 14th Infantry in 1813, and that his son, Chas. T. Dix, was commissioned as a lieutenant of the new 14th in the War of the Rebellion.

ing of the San Cosmo gate. The engineer officer who indicated to the 14th its line of attack at Contreras was Lieutenant Beauregard; a battery they supported for a time at Chapultepec was commanded by Lieut. Thomas J. Jackson; the engineer officer who led the way over the San Cosmo causeway was Capt. Robert E. Lee, and the officer who marched with them in command of a platoon of sappers and miners to the San Cosmo gate was Lt. Geo. B. McClellan.

"There's a divinity that shapes our ends,
Rough hew them how we will."

The colonel, lieutenant-colonel and five other officers of the Fourteenth were breveted for conspicuous gallantry in the battles in the valley of Mexico.

On the 29th of July, 1848, this splendid regiment was disbanded, and its battle-stained banners laid away in dust and darkness. After the call for 75,000 volunteers in 1861, the Chief Magistrate deemed it expedient also to increase the strength of the Regular Army. To meet the question of reorganization, a board was appointed by the President, consisting of the Hon. S. P. Chase, Secretary of the Treasury; Maj. Irvin McDowell, Assistant Adjutant-General; and Capt. William B. Franklin of the Engineers. The military members proposed a three-battalion organization of eight companies each for the infantry regiments. They recommended an addition of one regiment of artillery, one of cavalry and nine of infantry. This would have given 57 battalions for the last named branch of the Service.

Mr. Chase concurred, but Congress, in passing the act of July 29, only made the three-battalion scheme to apply to the nine new regiments. It must be understood that as to the general war policy of his administration, Mr. Lincoln of course consulted his Cabinet, but advised freely with General Scott, Adjutant-General Thomas, and as Mr. Welles has it in his memoirs, "a young man named Meigs."

The organization of the 14th Infantry followed promptly the President's proclamation. The headquarters of the regiment was fixed at Fort Trumbull, Conn., and the first order, temporarily assigning officers appointed to date May 14th to companies, was issued on the 8th of July, 1861. This order was signed by Lieut.-Col. John F. Reynolds, who organized the new regiment and was its first commander.

The colonel, Chas. P. Stone, had already been made a brigadier general of volunteers, and was serving at the time in General Patterson's army. He never joined the regiment until the fall of 1864, and then only for one day.

General Stone had served as a lieutenant of ordnance in the Mexican War. He resigned in 1856. In the trying period preceding the inauguration of Mr. Lincoln, he was very active and zealous in organizing an improved command for the defense of Washington. He was a refined, scholarly gentleman and an accomplished officer. But he was "too full of the milk of human kindness to catch the nearest way;" so it happened that he was probably more harshly dealt with than any officer who ever held a commission in our Army.

Lieutenant-Colonel Reynolds was a veteran who had been in the Service

since 1841. He had served in the Florida and Mexican wars, and was destined to a soldier's death, commanding an army corps on the field of Gettysburg. No better man could have been found to bind together the heterogeneous elements of which a new regiment was compounded.

He selected for his adjutant Lieut. Edwin F. Townsend (now colonel of the 12th Infantry) a West Point graduate who had resigned and gone into civil pursuits, but who had again accepted a lieutenant's commission when the War broke out; a position by no means commensurate with his merits, but which he accepted from purely patriotic impulses.

General George Sykes, the senior major, did not report, but Major G. R. Giddings and Major William Williams reported promptly and were assigned to the 2d and 3d battalions respectively.

As fast as the captains and lieutenants came they were assigned to recruiting stations, generally in the New England States and New York.

The first recruiting order was issued at Fort Trumbull, July 10, 1861.

The first company was organized and put into camp on the 17th of August. It was under the command of Captain Samuel Ross, a veteran, who had joined the Army as a private in 1837. A second company was soon organized and assigned to Captain Jonathan Hager. A battalion was organized, mustered and inspected on August 31st, and Lieut. W. R. Smedberg announced as adjutant.

So far the organization had run smoothly, but the regiment now met its first serious loss. Its lieutenant-colonel was made a brigadier-general of volunteers, and its adjutant was promoted to a captaincy in the 16th Infantry.

Major Giddings, who assumed command, was a son of the Hon. Joshua R. Giddings, the abolition leader of Ohio. Captains J. D. O'Connell and David B. McKibbin, officers of experience, reported in time to take up the good work. Of the civil appointees one, Coppinger, had seen service abroad, having been an officer of Papal Chasseurs. The other officers had little or no antecedent military training, but they were, with few exceptions, men of such quick apprehension, zeal and untiring application, that they learned their duties within a short time.

Among the men who first enlisted there were a number of well-trained soldiers; some of them had served in the old regiments of our Army and others in some of the European armies. Many of these men won commissions, and they all did much by precept and example to encourage the raw recruits. Indeed their influence was invaluable, as they not only taught the new men how to take care of themselves, but to make light of hardships.

Some educated gentlemen enlisted for commissions and won them soon. The men who won advancement in this honorable way were Lieutenants Perry, Peck, Choisy, C. G. Smedberg, J. K. Clay, Vernou and Browning.

So rapidly was the regiment recruited that eight companies and the band were organized and sent by the middle of October to Perryville, Md., where they went into Camp Stone, so-called, after their first colonel.

The battalion first organized was designated the Second, as General Sykes, the senior major, had been assigned to the command of the 1st Bat-

talion, but had not reported. As Major Giddings, the proper commandant of the 2d Battalion, was kept back at Fort Trumbull in command of the regiment, the command of the battalion sent to Perryville devolved on the senior captain, J. D. O'Connell—universally known in the Army as "Paddy." He had served in the old 2d Infantry from 1852 to 1861.

The 14th Infantry owes a lasting debt of gratitude to this noble man. He did more than any other officer to instruct it and to instill into it principles of patriotism, self-sacrifice and devotion. Captain O'Connell was not "brilliant," he was better than that, for in the best sense of the word he was a good man. He was single-minded and artless, diligent, faithful and self-denying. With him the interests of the men came first, the officers second and *his own last*.

The health of the command was not good at Camp Stone. This was attributed to bad water and a lack of fresh vegetables.

Sergeants Henton, Bellows and Loosley were promoted to lieutenants. Their advancement was a stimulus to others. On Dec. 18th the headquarters of the regiment was established at Camp Stone, Major Giddings in command, bringing Lieutenant Schuyler and King as adjutant and quartermaster. One company of the 3d Battalion joined soon after. The rest of the winter was devoted to drills and instruction.

On March 7th, 1862, Camp Stone was abandoned and the regiment proceeded under orders, first to Washington and thence to Fairfax, Va., where they joined the Regular Brigade under General Sykes, in the Army of the Potomac, on March 13th. Two days before the Confederate army had fallen back to the south of the Rappahannock and on the day the 14th reported for duty in the field, the President authorized the Peninsula Campaign. Thus it happened that in a few days the Regulars marched back to Alexandria, Va., and made their preparations to embark on transports for Newport News. Major Giddings, with headquarters, went back to Fort Trumbull. On March 27th nine companies under the command of Captain O'Connell embarked on a steamer at Alexandria and on the 29th debarked at Hampton, Va. From thence they marched with the rest of the brigade and went into a camp near Yorktown, Va., April 4th.

The regiment then formed a part of what was called the "Infantry Reserve Brigade," which was made up of the 2d, 3d, 4th, 6th, and parts of the 10th, 17th, the 11th, 12th, 14th Infantry, and the 5th New York—Colonel Warren's regiment, whose warriors were known from their Zouave dress as the "Red-legged Devils." The history of the brigade for the next month was that they worked in the trenches at Yorktown.

The 14th had now fallen under their senior major, but in his capacity of brigade commander. It would have been hard to find a better officer in the Army than General Sykes; a Southerner by birth, he was so thoroughly and simply a soldier, that he knew little of politics and cared less. His indifference to all civil matters was a subject of surprise to the civilian appointees who served with him.

He was unsympathetic and methodical, a man of details, diligent and untiring, but never hurried, never flurried; one of the coolest men in dan-

ger or confusion that we had in the whole Army. He enforced discipline like a machine and had apparently no more sentiment than a gun-stock.

On the 30th of April, in compliance with an order from the War Department, Cos. "A," "B," "C," "D," "F" and "H," 2d Battalion, and Cos. "E" and "H" of the 3d Battalion, were transferred to and designated as the 1st Battalion; all retaining their letter designations except "G," of the 3d, which became "G" of the 1st; "C" of the 3d became "C" of the 2d, and was attached as a supernumerary company.

On May the 8th the Confederates evacuated Yorktown, and for the next six weeks the history of the regiment was as uneventful as if it had remained at Perryville. It took no part in the battle of Williamsburg, but marched slowly up the Peninsula with the Army of the Potomac.

About the 17th of May, when the command was in camp at Cumberland, the Reserve Brigade, with the addition of the 10th N. Y. Vols., was formed into a division under Sykes, which with a division of volunteer infantry under Morell, constituted the 5th Provisional Corps under Maj.-Gen. Fitz John Porter.

The 1st Brigade of the Regular Division was under Lieut.-Col. Robert C. Buchanan, 4th Infantry, with Capt. Robert N. Scott as A. A. General, and Lieutenants Van Rensselaer and Powell as aides-de-camp.

The brigade was made up of the 3d Infantry, Captain Wilkins, the 4th Infantry, Captain Collins, the 1st Battalion, 12th Infantry, Major H. B. Clitz, and the nine companies of the 14th Infantry, Captain O'Connell.

The 2d Brigade was under the command of Lieutenant-Colonel Chapman, and was made up of the 2d, 6th, 10th, 17th and 11th Infantry and Warren's Brigade of his own, the 5th New York, and Colonel Bentick's 10th New York.

Sykes' Division took no part in General Porter's fight at Hanover, against Branch, or in the battle of Fair Oaks, but remained quietly in camp, 26th May until the 26th of June. For two years the history of the regiment will correspond closely with that of the brigade.

No better account of the battle of Gaines' Mill can be given than is given in the Official Report No. 146, War of the Rebellion Records, S. 1. Vol. xi., p. 2, p. 369.

HEADQUARTERS 1ST BATT. 14TH INFT. }
CAMP NEAR JAMES RIVER, VA., }
July 4, 1862.

SIR :—In compliance with instructions, headquarters of the brigade, I have the honor to submit the following report : * * * * *

June 27.—Ordered across the creek near Gaines' Mill, and engaged the enemy about seven o'clock, A. M., which continued till dark. The greater part of the day the battalion occupied the right of the 12th Infantry. I was directed to throw back the two right companies to protect the right flank.

With this formation I succeeded in driving the enemy clear from the field, following them up to the woods where they suffered severely.

I then retired to the crest of the hill, about 200 yards from the woods in front, and saw that the 3d Infantry was posted on the edge of the woods on my right flank, leaving some distance between its left and my right. Here a severe fire was poured in on my right flank from the woods, which caused me to change front and drive them from

that position. Again the enemy renewed their fire in my front, when I changed front and completely routed them, clearing them from the pine shrubbery in front of my position. I then returned to the crest of the hill, and finding the 12th and 3d Infantry had retired, that the enemy's infantry could not be seen, and that their artillery had a true range of the battalion with their shells, I retired also and took my position on the right of the 12th Infantry near the woods, just below the house near Edwards' battery.

From this point the battalion received a severe fire from the woods, which was vigorously returned by the battalion, slowly retiring in good order to the lane near the house referred to, where it took up and held a position until the troops were drawn from the field. During this engagement five officers,—Captain McIntosh, Lieutenants Sinclair, McElhone, Lyon and Hoover—were wounded, the last three badly. Eighteen enlisted men were killed, 113 wounded, and 12 missing. The list of killed is probably greater than here stated. The officers and men behaved well. At night crossed the Chickahominy and encamped on the ground that had been occupied by the general headquarters near Savage Station.

* * * * *

July 1.—Participated in the battle fought near that camp (Malvern Hill) having 1 man killed, 11 wounded and 1 missing. At night the 1st Brigade, which was in advance, formed the rear guard, and held the position while the troops were withdrawn, and covered the movement of the army to the rear.

July 3.—Moved to this camp.

At the battle of the 1st the battalion arrived just in time to engage a regiment of the enemy, which was completely routed. The officers and men behaved well. Captain McKibbin, the second in command, was everywhere his presence was required. The conduct on both the above occasions is much to be admired. The company officers in their places behaved in like manner. Lieutenant W—— absented himself from the battalion on the evening of the 1st and did not join until near the present camp and could not satisfactorily account to me for his absence from the battalion.

I am sir, very respectfully, your obedient servant,

(Signed) J. D. O'CONNELL,

Captain 14th Infantry, Commanding Battalion.

Lieutenant POWELL,

Adjutant 4th Infantry, A. A. A. G., First Brigade Sykes' Division.

P. S.—At the battle of July 1, the battalion took 11 prisoners, who were disposed of as directed by the division commander.

Colonel Buchanan in his report of the seven days says: "The two old regiments, the 3d and 4th, maintained their previous reputation, and the new battalions, the 12th and 14th, earned one for themselves." He complimented by name Captains O'Connell and McKibbin, as did also General Sykes.

In his report of the battle of Malvern, Sykes speaks with especial commendation of three well directed volleys which the 14th Infantry poured into a Confederate brigade, charging near the close of the battle, from the extreme right. This brigade is believed to have been Wright's of Huger's Division, and the regiment which suffered most from the fire was the "Louisiana Tigers."

The amended returns as we now have them, show that the loss of the regiment for the seven days was, killed, wounded and missing 255, including Lieutenant Hoover, who died of wounds received at Gaines' Mill. This was the heaviest loss in the division.

The loss of the brigade was 567. But for this a bloody retribution was exacted. The brigades of G. B. Anderson and Garland are known to have been the opponents of Buchanan's Brigade at Gaines' Mill. Their official loss is reported for the first named, 863, for the second, 844. About half of this loss was sustained at Gaines' Mill, and the remainder at Malvern.

Wright's Brigade lost 666 men at Malvern, and the "Tigers" alone lost 167 men. The 12th and 14th had a little side issue the evening before Malvern, which is known officially as Turkey Bend, Company C, 2d Battalion, taking 12 prisoners. After Gaines' Mill, Major Clitz and Captain Stanhope were left on the field severely wounded. After our withdrawal they reported that they were visited by a number of old army officers who had gone South: Hill, Anderson, Whiting, Stewart, and Jackson himself. All spoke with admiration of the firmness of the Regulars, and all expressed sympathy and offered assistance, except Whiting, who was born in Maine.

At Harrison's Landing the 20th Battalion joined July 5th. The companies reporting were A, B, D, E, F, G and H, under Captains Coppinger, Thatcher, Durkee, O'Beirne, Lawrence, Locke and Watson. Company C, under Lieutenant Broadhead, was already there.

The regiment left Harrison's Landing August 15th, and proceeded to Aquia Creek, marching thence with the 5th Corps to Warrenton, Va., where it joined the Army of Northern Va., under General Pope, the 27th of August. On the 30th of August, the two battalions of the 14th, in the 1st Brigade, 2d Division of the 5th Corps, took a conspicuous part in the battle of Manassas—"Second Bull Run." The reports are too full and the description of the battle too complicated to be quoted. General Sykes, speaking of the attack made about four o'clock, in what was called the turning movement from the right, says: "Butterfield's attack was gallantly made and gallantly maintained until his troops were torn to pieces. My first brigade, under Buchanan, moved to his aid, relieved him, and became furiously engaged."

The following is an extract from Colonel Buchanan's report:

"As soon as notified that I was unmasked by Butterfield, I advanced the two battalions of the 14th into and through the woods to his support, and held them there until after the brigade was entirely withdrawn, when my whole column was ordered to the rear. While in the woods we were under a most incessant fire of all arms, but my officers and men behaved admirably. Here it was that Captain O'Connell of the 14th Infantry was wounded in the knee while commanding the 1st Battalion, and Capt. D. B. McKibbin, 14th Infantry, in the ear, while commanding the 2d Battalion."

After the failure of this attack and the enemy had begun their counter-attack, the first brunt of which fell upon Warren's Brigade, the rest of the division was moved by the Henry House Hill, on which, a little more than a year before, had raged the fiercest fighting in the First Bull Run.

The following is an extract also from Colonel Buchanan's report:

"About 6 P. M. I was ordered to take the battalions of the 12th and 14th to the woods to our left and front to support Meade's Brigade, then severely pressed by the enemy; and almost immediately after placing these troops in position, I observed that the 3d and 4th had also been ordered up.

"I found the enemy in very strong force in the woods, and during the heat of a very severe engagement discovered that he was flanking me with large masses of troops. I immediately commenced to gain ground to my left so as to meet his movements, and held him in check for nearly an hour. But at length I found the contest too unequal; my command was being cut to pieces; the ammunition of the men nearly expended and the enemy's masses vastly outnumbering my force. I was forced to give the order to retire.

"This was done in most excellent order, the men marching steadily and slowly and I resumed my position on the plateau.

"Shortly after I was ordered to retire with my brigade to Centreville, which I did, and reached the point at 10 o'clock at night, having the entire brigade with me in good order and having left but few stragglers behind."

During this fight the rebels in the woods displayed the National colors. Captain O'Connell rode forward to ascertain whether they were in the hands of friends or foes, when he was fired on, again wounded, and his horse killed. The two lines not even forty yards apart fired into each other by volleys. This desperate fighting was maintained for an hour. The front attacks were constantly repulsed, but as the battle was hopelessly lost, the division was slowly withdrawn to Centreville.

The officers of the 14th present in the battle were as follows:

FIRST BATTALION.

Capt. J. D. O'Connell (wounded), Dr. Forwood, Captains Brown, Ilges, Watson, Smedberg, King and Burbank; Lieutenants Broadhead, Walker, Sinclair, Collins and Henton, Loosley (Adj.), and Krause (Q. M.).

SECOND BATTALION.

Captain D. B. McKibbin, Comdg.

Captains Coppinger (wounded), Thatcher, Locke (wounded), Durkee, Douglass, Lawrence, Overton; Lieutenants Wharton (wounded), Porter, Vanderslice, (Adj.), and Downey, (Q. M.)

The loss of the 1st Battalion in killed, wounded and missing out of 482 present, was 129, and of the 2d Battalion 48 out of 313 for duty. One officer of the 1st and four of the 2d were wounded. The officers of both battalions were commended in the highest terms for their coolness and bravery.

O'Connell and McKibbin were praised in all reports for their efficiency, and Major C. S. Lovell, who was three years after to become the colonel of the 14th Infantry, was particularly mentioned in General Sykes' report for his conduct.

The Confederate brigades of Toombs, G. T. Anderson and Cadmus Wilcox, are now known to have been engaged against Buchanan's and Lovell's; their loss was heavy.

From Centreville the Regular Division marched back to Hall's Hill near the Chain Bridge, over the Potomac.

There the 2d Battalion of the 12th Infantry, with two companies of the

8th, under the command of Captain Anderson, which had been campaigning with Banks' Corps of Pope's army reported and were assigned to the 1st Brigade.

From Washington the Division marched slowly to Fredericksburg, Md., and from thence to South Mountain, when it was held in reserve and was for a time under shell fire.

Early on the morning of the 15th, it marched over the crest of the hill covered with the killed and wounded of the battle of the preceding day, and thence to the Stone Bridge over the Antietam Creek near Sharpsburg.

Richardson's Division, which had preceded Sykes', formed to the right of the road and the Regular Division, after turning the head of the column to the left, came on right into line under a lively artillery fire, thus forming line of battle with Buchanan's right resting on the Sharpsburg road.

In the battle of Antietam the battalions in the 1st Brigade were commanded by captains, as follows: The 3d, Wilkins; the 4th, Dryer; the 1st battalion of the 12th, Blunt; the battalions of the 8th and 12th, Anderson; the 1st of the 14th, Harvey Brown; and the 2d by D. B. McKibbin.

In the great battle of September 17th, the Regular Division was held in reserve and in support of the reserve artillery until about two o'clock in the afternoon, when Capt. Hiram Dryer was ordered to cross the Antietam creek with the 2d and 10th, the 4th, 12th and 14th Infantry.

These regiments supported Tidball's batteries, and about sundown advanced and easily drove back the enemy into the village of Sharpsburg. Captain Dryer did not feel authorized to go further without orders, and applied for permission to press his attack. It appears from official reports that General Pleasanton also advised an advance. General Sykes told the writer after the war that it was on this occasion that General Fitz John Porter reminded General McClellan that his corps was the last reserve of the last Army of the Republic. It is needless of course to speculate on what might have been, but this can be said, that the Regular Division was that day in its best condition.

Captain Dryer rode into the rebel lines and saw that there were but two regiments and a battery left in the centre. That night there was gnashing of teeth in the Regular camp. A few days after the battle, a division forded the Potomac River and made a demonstration, which led to a partial engagement, which was called the action of Leetown. The 14th was in the fight and had a number of men wounded. For nearly six weeks after the battle our division remained in camp refitting, drilling, and doing picket duty. It marched with McClellan's forward movement, and at Snicker's Gap, under Captain O'Connell, who rejoined a few days before, had a very sad experience. A reconnoissance was ordered from the Gap to a ford on the Shenandoah by a force made up of a troop of Massachusetts cavalry, the 6th, 7th and both battalions of the 14th Infantry. The enemy was met in small force and easily driven across the river. But on the opposite bank there was a strong force of the three arms. It was not the intention to seriously engage this force, but only to develop its strength. Unfortunately Captain O'Connell received an order to advance even after a heavy fire of

artillery had been opened. He knew, as did all his regiment, that somebody had blundered, but on they went like the Light Brigade.

Both battalions advanced in line of battle to the banks of the river under a terrific fire, and when ordered to retire, they marched back as coolly as from a parade. Five enlisted men were killed, and Lieutenant Perry and twenty-six were wounded. Dr. Forwood, on this as on many other occasions, showed the utmost zeal, skill and devotion. Poor Paddy O'Connell said after the fight was over, the tears running down his seared and weather beaten face : " I would take the 14th to the gates of hell, but I would like to have a chance to whip the devil when I got there." From Snicker's Gap we marched to Warrenton Junction, where McClellan was relieved. The regiment marched with its proper command to Falmouth, opposite Fredericksburg. In the battle of December 13th it passed through a very trying ordeal. With the rest of the Regular Division it went to the front in the dusk of the evening, between Hanover Street and the plank road. About midnight we occupied the front line some 150 yards from the crest of the hill held by the Confederate line.

This position was kept for twenty-four hours under a galling fire which could not be effectively returned. On the morning of the 16th, Buchanan's brigade covered the retreat of the Army over the river, Captain O'Connell commanding the 1st Battalion; Captain Overton was the ranking officer of the 2d Battalion but Captain Thatcher was placed in command. The officers present with the regiment on this occasion were Captain O'Connell, commanding regiment, Captain Keyes acting field officer. *1st Battalion* : Co. A, Lieut. Henton; Co. B, Lieut. Walker; Co. C, Lieuts. Collins and Doebler; Co. D, Lieut. Bellows; Co. E, Capt. Burbank; Co. F, Capt. Smedberg and Lieut. Sinclair; Co. G, Lieut. Broadhead; Co. H, Lieut. Moroney; adjutant, Lieut. Loosley; asst. surgeon Dr. Bacon. *2d Battalion* : Capt. Overton, A. F. O.; Capt. Thatcher, A. F. O., commanding battalion; Cos. A and H, Lieut. Bainbridge; Cos. B and C, Capt. Watson; Co. F, Lieut. Porter; Co. E, Lieut. McKibbin; Co. G, Capt. Locke; Co. D, Lieut. Douglas; adjutant, Lieut. Vanderslice; asst. surgeon, Dr. Jaquett.

After Fredericksburg, the regiment remained in camp about one and a half miles back of Falmouth until the following May, with the exception of the episode known as the Mud March—a futile attempt to cross the Rappahannock, January 12th, 1863.

Our winter camp at Falmouth was a very memorable one to all of the Regulars, for it was there we became best acquainted with each other. But the members of the 1st Brigade became particularly well acquainted with "Old Buck," as Colonel Buchanan was playfully called. It was then and there that he first had a good chance at us. He soon took us in hand and we began to find out what discipline was, what army papers were, and, as he cheerfully assured us, that the regulations were not made for brigadier generals. But alas for army jesting, the veteran discovered before the end of his career, that even a hero of three wars could be forced to retire under the regulations sorely against his will.

During the winter we had no end of fatigue and picket duty, drills and recitation. By way of diversion, there was poker-play at night and horse

racing, steeple chasing, and shooting matches by day. We had also singing clubs, and grotesque societies. These were the last days of commissary whiskey, and the good fellows of Sykes' division are not likely to forget one celebration in Snip Snyder's commissary tent, which brought the division commander around about 2 o'clock one night with the inquiry: "Gentlemen, what is the occasion of this sudden outburst of inebriety?"

But as Fighting Joe Hooker had been put in command, we knew that the "general" would be sounded in our camp early in the spring. It came the last week in April.

Before this, many changes had been made. General Meade had been placed in command of the 5th Corps, General Warren had been placed on the headquarters staff, Colonel Buchanan had been relieved and General Ayres had assumed command of our brigade.

Captain O'Connell had gone on recruiting service and Captain Hager had assumed command of the regiment in the field. On the first of March, 1863, there was a consolidation of companies in the Regular Division, and two battalions of the 14th were reduced to one battalion of eight companies, A, B, D, E, F and G of the 1st, and F and G of the 2d.

The officers were Captains Hager, Brown, Thatcher, Norton, Ilges, Coppinger, Lawrence, Clay, McCall and Lieuts. Downey, McKibbin, Weir, Tom Collins, Sinclair, Miller, Foote, Porter, Vernou, McClintock and Douglas; Captain Joe Locke was on the brigade staff. Camp was broken for the Chancellorsville campaign April 27th; we crossed Ely's Ford of the Rapidan on the night of the 29th, the men, stripping to the buff, wading through with shouts and laughter. On the morning of the 1st of May the Regular Division marched down the Fredericksburg pike, to meet McLaws' division coming up. The second brigade, then much reduced in numbers, was in advance as skirmishers. The 12th and 14th marched after them in line of battle to the right and left of the road. We soon met the enemy and drove them before us for more than a mile with a perfect rush. The men were full of fight and moved with alacrity. In the first rush a whole company was captured. We were halted in line near the cross-roads, leading to Banks' Ford. But, alas, we were ordered back. Then there was heard cursing and grumbling from the Regulars, not at being ordered into danger, but at being ordered out. All knew too well that again somebody had blundered. In the dusk of the evening we were placed in a new position facing the woods beyond the plank road. Here a brigade of the enemy ran on us, I think by mere chance. The 5th New York (the Red Legs), had a sharp fight, but the rest of us only fired a few volleys which sent our opponents to the right-about. While this was going on I heard a chaplain shouting out behind us: "Give 'em Hell, boys; give 'em Hell, and the Lord have mercy on their souls."

But, alas, how terribly is the comedy and tragedy of war intermingled.

With almost the last volley of the fight gallant young Temple, the darling of the 17th, was killed. Then Jerry McKibbin, a brave and generous man, dashed into the line and carried Temple's body out on his horse. It was buried that night at the foot of a tall, solitary pine, while Weed's Battery,

that stood near, sent shell after shell into the enemy's lines. The whole scene reminded us all of the funeral of Sir John Moore.

When the 11th Corps broke, two days after, we were hurried over at the double to take the right of the line, but we had a mere skirmish. The regiment lost one officer (Overton) wounded, five enlisted men killed and six wounded. Major Giddings arrived just after the battle and assumed command. After the Army of the Potomac returned to the north of the Rappahannock, foiled but not defeated, the Regular Division resumed its old camps. We had sustained but little loss from the enemy, but our ranks were severely depleted from other causes. The loss from desertion was very great and most discouraging, and we were getting but few recruits to make up for our losses. The 14th had lost as many as seventy-two in a single month. The total in the year was four hundred and thirty-one.

Immense local bounties were being paid all over the country for men to fill the volunteer regiments, and the Government bounty of \$200, which was all that could be given for enlistment in the Regular Army, was no inducement to men who could get from \$1000 to \$2000. Hundreds of men left us to go and enlist under assumed names elsewhere. Then, of course, many were discharged for disability. At the same time many officers were sent away from us on detached service. Here a short description of the general method of campaigning followed in the later operations of the War may not be out of place.

Each regiment or full battalion had two wagons for the companies and one for headquarters and hospital, unless the command was small, when the third wagon was dispensed with. Officers' messes generally had a sumpter horse or mule of their own that followed the column. In the last year of the War, when mules got scarce and darkies were plenty, these sable strikers often carried the stewpans and provender. In the immediate presence of the enemy shelter tents were used by all. Camps were generally made by regiments in columns of divisions, winter cantonments were larger, cribs were put under the tents, or small log houses made or "dug-outs" were substituted if the camp was on a hill side. Some of the sutlers were very enterprising and had reasonably good stock of staple articles. If all else failed, they generally had whiskey and gin cock-tails.

The camp ration was generally coffee and hard tack, beef or bacon, beans and rice.

Unless the march was to be a secret one the "general" was sounded at corps headquarters and repeated in rapid succession at division, brigade and regimental headquarters, and was succeeded for a few minutes by a pandemonium of shouts, yells, cat calls, barkings and the like. This would be followed by a period of well systematized activity, which caused the most elaborate camps to disappear like a mist.

Tours of picket duty lasted three days when in permanent camp. As a rule Mahan's system of outpost duty was pretty closely followed.

The march to Gettysburg began June 13th, the regiment marching with the Division to Manassas Junction and Leesburg, Va.; crossing the Potomac near Edwards' Ferry, it marched thence through Frederick, Md., to Han-

over, Pa., arriving there on July 1st, to learn that the fighting had begun at Gettysburg.

A night march was made and the command bivouacked within ten miles of the field of battle.

About noon of the second day's battle, the 5th Corps reached the field. It was held in reserve until the disaster to the 3d Corps and the attack on the Round Top. Doubleday gives this account of the fight :

"Then Ayres, who had been at the turning point of so many battles, went in with his fine division of Regulars, commanded by Day and Burbank, officers of courage and long experience in warfare. He struck the enemy in flank who were pursuing Caldwell, and who would have renewed the attack on Little Round Top, doubled them up, and drove them back to the position Caldwell had left. But his line, from the nature of things, was untenable, for a rebel brigade with ample supports had formed on his right rear, so that nothing remained but to face about and fight his way home again. This was accomplished with the tremendous loss of fifty per cent. of his command in killed and wounded."

Major Giddings, in command of the 14th Infantry, reported a loss of 141 officers and men. The amended report of casualties in the War Records gives the loss as 18 men killed, 2 officers wounded (Captain Locke and Lieutenant Douglas), and 108 men wounded and 4 missing; a total of 132. There were present in action 490 men.

A great loss to the regiment was their Lieut-Colonel, Gen. John F. Reynolds, killed in action July 1st, commanding his corps.

After Gettysburg the regiment marched in the 5th Corps to Williamsport, where Lee escaped across the Potomac; then to Berlin, where the Potomac was crossed, and so on to the Rappahannock.

On August 13, the brigade was sent to New York City to maintain order and prevent a recurrence of the draft riots. All actual rioting and resistance to the civil authorities had ceased before its arrival. After remaining a month in camp at Madison Square, the 14th went to the front, going into camp near Culpepper on September 24.

The regiment took part in the so-called Mine Run campaign; during the winter of 1863-64, with the other regiments of the Regular Brigade, it was engaged in guarding the line of the Orange and Alexandria R. R. In this duty it had many conflicts with rebel raiders and bushwhackers.

Any of the latter class caught in an attempt to burn bridges or to destroy the railway, were, under existing orders, hung at sight.

Preceding the campaign of 1864, a number of conscripts were received and distributed. Ours were drafted for us in the District of Columbia. Towards spring a number of convalescents returned from hospitals, and by the end of April, the 14th had one battalion of about 550 men present for duty.

In Grant's Wilderness campaign, the old Regular Division was melted down into one brigade and so weak had the regiments become that three volunteer regiments were added. These were the 140th and 146th New York, and 155th Pennsylvania. The Regular Army was represented by battalions of the 2d, 11th, 12th and 14th Infantry. The battalion of the 14th

under Captain E. McK. Hudson, was made up of A, C, D, G and H of the 1st and Cos. A, B and C, 2d Battalion. Captain Hudson, a graduate of the Military Academy, had served two years in the 3d Artillery before the War. In his old regiment he was called cool and handsome. He proved a dashing and brave commander for the regiment, and did much during the winter to bring it up to a high state of efficiency.

When camp was broken on the 3d of May the following officers were present: Hudson, Keyes, Miller, Ilges, Burbank, Brady, C. McKibbin, Perry, Sinclair, Tom Collins, Broadhead, John Clay, Krause and Drake DeKay; Coppinger, Smedberg and Choisy were with the division on staff duty. On the morning of May 5th there were 516 enlisted men present to fight.

At an early hour Griffin's Division started from the Lacy House up the Orange plank road with Ayres' Brigade in advance. We had not far to go before we met Jones' Brigade of Johnson's Division of Ewell's Corps. At the point of contact, the 14th Infantry was drawn up across the road in line of battle. The 12th Infantry was in line on the right in heavy timber, and the volunteer regiments forming a second line. The 6th Corps should have been on our right, but was not. The regiment had a cleared field in its front, and the Confederate line was two hundred yards away on the far side of the field. A section of artillery was in the road. Without waiting a moment Hudson ordered and led a charge at the double. The regiments to the right and left could not keep up on account of the tangle of brush they were in. The 12th on the right was soon attacked in front, flank and rear and had a hand to hand fight with Jones' Virginians. The 14th broke the line in their front without firing a shot, but were compelled to retire slowly by Stewart's North Carolina men, who came to reinforce Jones. We all had to fall back until we found a cross road on which we could reform. Then the fight was kept up until night. There was not a more brilliant charge than that made by the 14th, but it paid dearly for the glory of driving the Stonewall division; Hudson, Smedberg and Broadhead were wounded, and Captain Burbank and Lieutenant Tom Collins were killed. Lieutenant Collins' body is believed to have been burnt up in the burning woods; it was never found.

The loss during the month was 240 enlisted men, killed, wounded and missing. On the 6th, the fight was in burning woods and suffocating smoke. On the 8th, after the rest of the 5th Corps moved to Spottsylvania, the 12th and 14th Infantry remained behind with Bartlett's Brigade of our division to hold the right of the line. Patrick's provost guard brought up a large detachment of coffee coolers, who were put in our ranks. After this we had a little private fight of our own with one of Ewell's divisions.

At the battle of Spottsylvania, Lieut. John K. Clay was killed, Captain Keyes mortally, and Lieutenant Sinclair severely wounded; twelve enlisted men were killed and eighty-three wounded in the battle.

The fate of Captain Keyes was inexpressibly sad. He received a terrible gunshot wound just above the heart.

He was taken to a field hospital and laid on a bed of leaves with an officer of the 12th Infantry who had been wounded about the same time. There

was serious apprehension that the hospital and its inmates might fall into the hands of the enemy. So the 12th Infantry officer made a masonic sign to a sanitary commission official, and appealed to him to get him back to Fredericksburg. Keyes, utterly helpless, whispered: "Vouch for me as a Templar." The good Samaritan came and said, "My poor brother, you cannot be moved." Then Keyes whispered, "Tell him I have just been married. I know I cannot live, but I must see her again before I die." The Templar turned away weeping, but soon an ambulance was taking the two officers to the rear. Captain Keyes did see his young bride again—his loving young wife so soon to be a widow.

On May 18th, Capt. D. B. McKibbin reported and assumed command.

The regiment did some good service at the battle of North Anna. The brigade crossed at the Jericho ford and got in some telling work on Cadmus Wilcox's Division, making a return call for their Henry House visit at Manassas.

In the fight at Bethesda Church, the regiment lost six or seven men killed, and Captain McKibbin was taken prisoner, but the regiment gave as good as it got.

On June 2d an attempt was made to withdraw the 9th Corps from the right of line and to march it to Cold Harbor, but the enemy at once rushed over our intrenchments and got in rear of Ayres' Brigade, which, however, changed front and drove them back, but in making this change of front, a few were taken prisoners. No precaution seemed to have been taken to protect his flank, nor did the general staff of the Army see that movements were so co-ordinated as to guard against such surprises. We lost thousands of prisoners and many valuable lives from this method of issuing orders and then trusting to luck that they would be properly and successfully carried out.

Captain Thatcher took command and under him the regiment marched to Petersburg, and was next seriously engaged in the attack on the enemy's intrenchments, on June 18th and 19th, in which we lost one officer wounded and 24 men.*

At the battle of Weldon R. R., August 18th to 19th, Captain Ingraham was in command until on account of sickness he relinquished command to Lieutenant Foote.

On the first day, the brigade under Hayes repulsed a fierce attack of Mahone's Confederate Division.

The loss of the regiment was severe, particularly in officers. Captain O'Beirne and Lieutenant Perry were wounded on staff duty, and Lieutenants Foote and Weir with the regiment, and Lieutenant Brady was missing. That night there was but one officer for duty; four officers of other regiments were attached (Lieutenants White, Jackson, Smith and Driscoll).

The next day the Confederates worked their way through the thick woods and got in rear of the brigade, and the whole line charged to the rear losing many prisoners, but capturing some. The hand to hand fight-

* The regiment advanced as skirmishers on the brigade front. Fort Sedgwick, better known as Fort Hell, was subsequently built on the ground where our skirmishers made their fox pits in front of the Confederate Fort Damnation.

ing in the woods was of the most desperate character. Captain Newburg of the 12th was killed after he was wounded and a prisoner in the hands of the enemy. Sergeant La Belle, one of the color sergeants of the 14th Infantry, saved his color, although he was severely wounded. Sergeant Ovila Cayer of Company A, in saving one of the colors showed such conspicuous valor that he received a medal of honor.

On the 19th Lieut. Chambers McKibbin was wounded and the regiment had no officer of its own for duty. On the 21st the lines were fully re-established and thereafter held. The loss of the regiment was 111 killed, wounded and missing out of 295 present for duty.

The next battle in which the regiment was engaged was on Sept. 30th, 1864, at Poplar Grove Church or Chappel's House, which was fought over the ground on which the National Cemetery near Petersburg is located. The regiment was commanded by Lieutenant Sinclair. The 12th Infantry was also commanded by a Lieutenant Winston, who was killed there. This last fight was a victory in which our loss was small, only two killed, and that of the enemy severe. Private Robert Wright of the regiment received a medal of honor for gallantry in the battle. A number of officers soon after reported: Captain McClintock and Lieutenants Krause, Downey, Bellows, Loosley and Browning.

The last battle of the Rebellion in which the regiment took part was the action at Hatcher's Run, to the west of the Petersburg lines, Oct. 27, 1864. For some unaccountable reason the War Department has refused to give the Regular regiments credit for this engagement. Yet the Regular Brigade was there, held in reserve on the bank of the creek within two hundred yards of the firing line, and under fire at Armstrong's Mill Crossing.* The loss of Ayres' Division was 229 men.

Gen. Fred. Winthrop, one of the bravest and most brilliant captains of the 12th Infantry, who had been made colonel of the 5th New York and then a brigadier-general of volunteers, had command of the Brigade. The regiment remained in the field until the first of November, when it was ordered North. First it was sent to Buffalo, N. Y., where it remained until after the presidential election. For a few days the headquarters and the first battalion were located at Fort Wadsworth, from thence they were transferred to Elmira, N. Y., where the warriors made the acquaintance of their new major, Gurden Chapin, who began at once to tighten the reins of discipline.

The headquarters of the regiment were transferred back to Fort Trumbull on the 11th of Jan., 1865, but the first battalion remained at Camp Chemung, near Elmira, under Capt. D. B. McKibbin, until it was transferred to Hart's Island, Feb. 20th. This battalion was placed under the command of Major E. McK. Hudson, ordered to the field in March arrived at City Point April 4th, and was assigned to duty as one of the Provost Guard of the Army of the Potomac. On the 9th it appeared that they proceeded out to Burkesville Junction; from thence joined the headquarters of the Army of the Potomac. They marched with that army to Richmond, Va., and at a grand review of the Army as it marched through the capital of the fallen

* Humphreys "Va. Campaign," p. 302.

Confederacy, the 14th Infantry was given the right of the line by the express order of Major-General Meade, who said to Major Hudson, then commanding it: "The 14th Infantry has always been in front in battle and deserves the honor."

After that the regiment remained in Richmond on provost duty.

The officers of the regiment in the field in April, were Captains Hudson, O'Connell, Brown, Krause, McClintock, Overton and Clay and Lieutenants Browning, Vernou, Hollins, Porter, Lord, Mills, Choisy and Henton.

The review in Richmond, before General Halleck, marked the termination of the war service of the regiment in the Rebellion. Ten officers, and 158 enlisted men were killed in battle and 206 died of disease or from accidents incident to the Service, making a total of 374 in the War; a heavier loss than was sustained by any regiment in the Service of similar enlisted strength. Compared with all the infantry regiments mustered into the Government service it stands number 47 in aggregate loss; in this number six colored regiments are included, which sustained but a small loss in battle, but a frightful loss by disease. The loss of the 14th from this cause was very small.

There is no mathematical measure of merit. In civilized warfare you cannot kill without taking your chances of being killed, otherwise, war would be butchery not bravery. It is some consolation, however, to know that you have inflicted as great or a greater loss than you have sustained. But in fact both of these tests are fallacious. The men who maintain their discipline when others are shaken, who show fortitude in misfortune when others are discouraged, and bravery and enthusiasm in danger when others are appalled, are the men who deserve honor and renown.

Before passing to the frontier history of the regiment, it seems proper to refer briefly to the records of a few officers who although they belonged to the regiment did not actually serve with it.

A few days after the battle of the Weldon Railroad, General Stone came to regimental headquarters in the field. General Hays had been taken prisoner and the brigade was under the command of a volunteer colonel. General Stone reported as a colonel, having resigned his volunteer commission, but his rank would have given him the command of the brigade. As soon as this was ascertained he was ordered back to Army headquarters on some nominal duty.

Few men were more likeable than our first colonel, and few men had warmer friends. Yet from the first he was doomed to misfortune. After the unfortunate battle of Ball's Bluff, the friends of Colonel and Senator Baker blamed General Stone for mismanagement and to this the more serious charge of disloyalty was added and pressed by Senator Sumner and Governor Andrew of Massachusetts. This allegation seems to have no other foundation than an uncertain story, that General Stone while commanding the line of the Potomac above Poolesville, Maryland, let some negro servants of a rebel family in Leesburg, pass in and out of the lines by his authority. When this statement was referred to him, he indignantly refused to make an explanation to a charge that was really anonymous although urged by a senator and a governor. He was not sustained by General Mc-

Clellan, was put in arrest and sent to Fort Lafayette and afterwards to Fort Hamilton. As is known to all he never could get a trial, or an investigation. With singular inconsistency General McClellan recommended him for a corps commander. Subsequently when he was made chief of staff in the Department of the Gulf, General Banks made himself responsible for his loyalty.

After the Red River expedition General Stone was again made a scape-goat. He was succeeded as colonel by Gen. Gabriel R. Paul, who never reported, as he had lost his sight by a terrible wound received at Gettysburg.

General Sykes, the senior major of the regiment, never reported as such, but commanded it as division and corps commander in many battles. He was a model infantry officer.

Colonel John H. King, who succeeded General Reynolds as lieutenant-colonel, never reported. Major Levi Bootes never served with the 14th Infantry in the field, but he had served up to the date of his promotion as senior captain, commanding the 6th Infantry.

FRONTIER SERVICE.

In some way it became known before the order was issued that the 14th Infantry would be designated for a tour of duty on the Pacific Coast.

After the disbanding of the volunteer forces many wild characters found their way into the ranks of all the Regular regiments. Some of these men had done good service in the field, but they adopted a theory that as the War was over, discipline would be relaxed and that they should be permitted to have what they were pleased to call "a high old time." Nor was this pleasing theory confined to the ranks; a number of officers came to grief from practices under an epicurean philosophy which the War Department deemed "more honored in the breach than in observance." Thus it happened that the 14th got more than its share of Bacchanalian warriors.

In the last week of July the 2d Battalion left Richmond for New York City, followed in a few days by the 1st. Both assembled at Hart's Island, where they made their preparations for a trip to California via Panama. From the 2d Battalion alone, 221 men deserted in two weeks. They were all reported as bounty jumpers, assigned just before the close of the War.

It sailed from New York City on August 15, 1865, under Major Louis H. Marshall. This officer only reported for duty a few days before, having been on staff duty as colonel, A. D. C., up to the 28th of the preceding July. In passing over the Isthmus, the new men gave proof of their quality, for they proposed to take Aspinwall and Panama, and it was only by the courageous and forcible efforts of the officers, non-com. officers and old soldiers that the unruly element was subdued and the battalion safely embarked on the Pacific side.

Col. Chas. S. Lovell, who had been promoted to the colonelcy of the regiment upon the retirement of General Paul on February 16, 1865, reported for duty at Hart's Island, N. Y. H., August 28, 1865. He was the first full colonel to assume command of the regiment since its reorganization. The organization of the Third Battalion was begun and vigorously

pressed. At the same time the First Battalion was filled up, and on October 16th the field, staff and band of the regiment and four companies of the 1st Battalion, E, F, G and H, under Colonel Lovell, left New York and landed in San Francisco, November 12th, taking station temporarily at the Presidio. Cos. A, B, C and D followed two weeks later.

The Third Battalion, under Major Chapin, followed in November, arriving at San Francisco early in December. Here there was an outburst of turbulent hilarity which manifested itself chiefly in cutting off the pigtails of the Pagans. The battalion was hurried away to Arizona, where the exuberance of the young warriors could find less objectionable play in cutting off the scalp-locks of Apaches. The headquarters of the battalion under Major Chapin was fixed at Goodwin, with companies detached to Crittenden, Lowell, Grant and Bowie.

In October of 1865, the Second Battalion, under Major Marshall, had been sent to the Department of the Columbia, the officers for duty being Captains Ross, Coppinger, O'Beirne and Walker, and Lieutenants Henton, McKibbin, Wharton, Porter, Perry, Collins, Tobey and Kistler. Colonel Lovell soon followed with his regimental staff, Downey and Bainbridge, establishing headquarters at Fort Vancouver, December 8th.

In January of 1866, the 1st Battalion, under Major Hudson, was ordered to Drum Barracks and from thence to Fort Yuma, California, at which post the headquarters of the battalion was established February 6th, Co.'s A, B, C, G and H constituting the infantry garrison, Co.'s E and F having been left at Drum Barracks, and Co. D sent to Date Creek. On the 17th Captain O'Connell succeeded to the command. Subsequently Co. H was sent to Date Creek, and B and D to McDowell. In October the headquarters of the battalion were at Fort Whipple with Captain Krause in command.

The headquarters of the regiment remained at Vancouver Barracks until June, 1866, when it was ordered to San Francisco and thence to Arizona, where it was established September 6, 1866. The band was left at Fort Yuma.

In January, 1867, the headquarters of the regiment was transferred to Camp Lowell, Tucson, Arizona, where January 23, 1867, the provision of the act of Congress of July 28, 1866, altering the battalion organization into a regimental one was carried out and the 1st Battalion of the regiment with two companies subsequently added, became the 14th Infantry.

The 2d Battalion, which had remained in Oregon and Washington, became the 23d Infantry, and the 3d Battalion, which was serving in Arizona, became the 32d Infantry. On the 16th of April the headquarters of the regiment were established at Fort Yuma, in which military Tophet it remained until May, 1869.

Under the reorganization of 1866, the captains were distributed as follows: To the 14th Infantry, Captains Ilges, Smedberg, Krause, Wharton, Weir, Van Derslice, Bainbridge and Vernou. To these were added Captains Hamilton and Davis for the two additional companies.

Captains D. B. McKibbin, Brown, O'Beirne, Downey, Miller, Perry and Fergus, were assigned to the 32d, and Captains Ross, Clay, Coppinger,

Brady, Walker, Sinclair, Henton and Browning were assigned to the 23d Infantry.

Of the field officers the 14th retained Colonel Lovell and Lieutenant-Colonel Wallen; Maj. L. H. Marshall went to the 23d and Major Chapin to the 32d. In January of 1867, the 14th Infantry was distributed at the following stations: Yuma, McDowell, Mojave, Lincoln and Camp in Skull Valley, without question the worst in the country. During this tour of duty nearly every monthly return contains a record of Indian scouts; some months nearly every company would be out. In September, 1868, the distance marched by these scouting parties aggregated 1000 miles, equivalent to double the distance elsewhere. Two companies marched 350 miles in August. The skirmishes rarely rose to the dignity of a battle, but they taxed the courage and skill of the participants to the utmost. One of the commonest entries is that of "mail carriers killed by Indians." Several hundreds of miles of wagon road were made by the regiment, and when the men were in camp they were almost constantly engaged in building barracks and quarters.

In the reorganization of the Army in 1869, the 45th Infantry, one of the Veteran Reserve regiments, was consolidated with the 14th Infantry. In compliance with S. O. No. 17, A. G. O. 1869, the 14th Infantry was transferred to Nashville, Tenn., the headquarters of the 45th Infantry, taking with them the officers, non-commissioned officers and ten men of each company. The other enlisted men were discharged or transferred to other regiments remaining in the Department of Arizona. The consolidation was carried out, the result appearing in the monthly return for July. The field officers assigned to it were Col. C. S. Lovell, Lieut.-Col. Geo. A. Woodward and Maj. M. M. Blunt. Lieutenant McCammon was made adjutant and Lieutenant Steele was retained as quartermaster.

The captains of the reorganized regiments were: Ilges, Krause, Van Derslice, Freudenberg, Trotter, Hamilton, Bainbridge, Carpenter, Burke and Davis. Their stations were Nashville, Humboldt, Chattanooga, Louisville, Jeffersonville, Lebanon and Union, W. Va.

In April, 1870, the regiment was transferred to Fort Randall, Dakota, on account of a threatened Indian war. In August it was transferred to the Department of the Platte, with headquarters at Fort Sedgwick, the regiment and post being under Lieut.-Col. G. A. Woodward. In the following March (1871) the headquarters was transferred to Fort Laramie, Wyo., where General John E. Smith reported and assumed command. Colonel Lovell had been retired December 15, 1870. General Gordon Granger, a colonel unassigned, was assigned to the regiment, vice Lovell, but on the 20th of December General Smith, who had been assigned to the 15th Infantry, was transferred to the 14th, General Granger at the same time being assigned to the 15th Infantry. Colonel Lovell died very soon after his retirement. He was loved and respected by the regiment. He was sincere, courteous and just, a good soldier and a good friend. The new colonel was a very different man. From all accounts of him he knew little and cared less for the traditions of the Service. He was a rough and ready fighter, who had done good service as a volunteer general. He would have led his

regiment into a fight as gaily as into a frolic, but opportunity was never given him.

In February, 1874, Lieutenant H. Robinson was killed in an Indian fight near Laramie Peak, while guarding a supply train. In the following August the regiment went to Utah, with headquarters at Fort Douglas. Four companies went on to Fort Cameron under Lieutenant-Colonel Woodward.

While this battalion was at Cameron, the Mormon Bishop John D. Lee was arrested and held there as a prisoner, pending his trial as the leader of the band of Danites (or destroying angels) who perpetrated the Mountain Meadow massacre. After his conviction he had his choice under the laws of Utah, as to whether he should be hung, beheaded, or shot. He chose the latter method of execution. To carry out the rules of poetic as well as moral justice he was taken to the scene of the massacre and shot to death by musketry in March, 1879. A detachment under Lieutenant Patterson was sent down to preserve order. An attempt was made to convert Lee from the error of his ways, while he was confined at Cameron, but he maintained the scriptural doctrine to the last, "that the enemies of God should be exterminated root and branch," and finally met his fate with the equanimity of a martyr.

In 1876 the Sioux War broke out which opened up with the Custer massacre and the repulse of General Crook at the Rose Bud. In June, companies C, B, F and I (Burke, Kennington, Tobey, Taylor, Yeatman, Murphy and Calhoun), were sent to join Crook's column.

At Fetterman they met detachments from the 4th and 9th Infantry. The infantry column was placed under the command of Major Alexander Chambers, 4th Infantry, and hastening to join General Crook on the Little Goose Creek, enabled him to assume the offensive. Their only battle was at Slim Buttes, September 9th, where twenty-seven Indians were killed.

This column marched in three months 1139 miles. It was on the march from the Little Missouri to the Black Hills that the whole column was nearly reduced to starvation. Another company on escort duty marched 377 miles in one month. In November Companies D and G, under Captain Krause, were in (Crook's) the Powder River campaign, and were with McKenzie at the battle of Crazy Woman's Fork, November 26th, coming up with the infantry under General Crook. This column marched 735 miles. The officers present were Krause, Van Derslice, Hasson, Austin and Kimball. In 1877 one company was in the Nez Percé campaign and five under Major Bryant in the Bannock War, but they did not have a battle. Three companies, Trotter's, Krause's and Van Derslice's, were out the next year after the Bannocks.

In 1879 four companies, E, I, H and K, under Trotter, Carpenter, McConichie and Taylor, and Major Bryant commanding, were hurried down to the scene of the Thornburgh massacre, but arrived too late to get into the battle. But they did have all the hardships and privations of a hard Indian campaign.

In all the Indian campaigns of the regiment, their endurance, patience, vigilance and bravery were tested to the utmost. They suffered from

the most suffocating heat in Arizona and the most intense cold in Wyoming.

The Apaches and the Sioux were formidable enemies, but they dreaded them less than sand storms and snow storms, scarcity of food and bad water. Many men broke down under these trials, who easily endured all the hardships of the Rebellion.

Besides the battles mentioned in the narrative, detachments of the regiment were engaged in the following skirmishes :

February 23, 1866, Captain Walker and Lieut. T. F. Tobey with a detachment of fifteen soldiers of the 14th Infantry and twelve Oregon Volunteers, attacked and defeated a band of Snake Indians on Jordan Creek, Oregon, killing 18 and wounding 2 Indians. One man of the 14th was killed and 1 wounded.

On October 10, 1867, Captain Krause with a detachment of twenty-five men of the regiment attacked a Rancherio, twenty-five miles from Camp Lincoln, defeating the Indians, killing and wounding a number and capturing a lot of arms.

In a fight near Aqua Frio Springs, Arizona, November 13, 1867, Lieut. A. J. Converse and two men of Company C were wounded. Indians repulsed.

April 27, 1867, Lieutenant Western, with a detachment of ten men from Camp Logan, attacked a band of forty-five hostile Indians on Silvies River, fording the river neck deep. The Indians were defeated, 6 killed and a number drowned in trying to escape. Thirty-two horses and large amounts of supplies were taken. Complimented in orders (G. O. No. 32 Department Col. 1867).

Lieutenant Hasson, in the months of September, October, November and December, 1867, in command of detachments from his post, had engagements with the Apaches at Three Buttes, Hualopais Valley, Hitchie Springs and the Willows.

March 25, 1868, Captain Ilges and eight men attacked fifty Indians with stolen cattle at Cottonwood Springs, Arizona. The engagement lasted twenty minutes. Private Logan, Company B. was wounded. One Indian was killed and two wounded.

February 27, 1869, in an attack made by Apaches on a train near Camp Grant, Arizona, two men were severely wounded, but the attack was repulsed.

May 6, 1869, in an attack on a train near Grief Hill, one private of the regiment was killed, but the Indians were so impressed by the operations of breech-loaders, then used on them for the first time, that they regularly stampeded.

In May 1881, Colonel Smith was retired and was succeeded by Lewis Cass Hunt, who was colonel of the regiment until his death, September 6, 1886.

In August 1881, the headquarters of the regiment was transferred from Camp Douglass, Utah, to White River, Col., and in May 1883, they were removed to Fort Sidney, Neb., and in July 1884, to Vancouver Barracks, W. T.

In this department the regiment has had only the ordinary routine duty to perform, except the suppression of the anti-Chinese riots in Seattle in November 1885 and February 1886.

In September of this year Colonel Anderson was promoted to the colonelcy of the regiment *vice* General Hunt. Lieutenant-Colonel Woodward was promoted to the colonelcy of the 15th Infantry on January 10, 1876. Lieut.-Col. Henry Douglas was promoted in his place on that date; he was promoted colonel of the 10th Infantry, July 1, 1888, and was succeeded by Lieut.-Col. I. D. DeRussy. Major M. M. Blunt was promoted October 4, 1874, lieutenant-colonel of 25th Infantry and was succeeded as major by Major Montgomery Bryant, who held the position until June 1882, when he was succeeded by Major W. F. Drum, who in his turn was promoted December 8, 1886, and was succeeded by Major Charles A. Wikoff, the present major of the regiment.

The regiment has as it stands to-day, twenty officers with war records, not counting those who have since served in Indian wars, nearly all of whom have been wounded in battle. Many of our "comrades and companions" have returned to civil life and are working honorably and successfully in civil pursuits. But the grave has closed over most of our men of '61.

"The brightest have gone before us
The dullest remain behind."

Nevertheless, those who remain, cherish the hope that those who succeeded us may be encouraged by this history to do what the men of the 14th Infantry have always tried to do—THEIR DUTY.

APPENDIX.

ROSTER OF COMMISSIONED OFFICERS, 14TH INFANTRY.

Colonel, THOMAS M. ANDERSON.

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|---|---|
| Lieutenant-Colonel, I. D. DERUSSY. | Adjutant, 1st Lieut. R. T. YEATMAN. |
| Major, CHARLES A. WIKOFF. | Quartermaster, 1st Lieut. J. H. GUSTIN. |
| A. Captain A. H. BAINBRIDGE, 1st Lieut. G. T. T. PATTERSON, 2d Lieut. W. B. REYNOLDS. | |
| B. Captain P. HASSON, 1st Lieut. J. MURPHY, 2d Lieut. J. P. O'NEIL. | |
| C. Captain D. W. BURKE, 1st Lieut. WM. W. MCCAMMON, 2d Lieut. E. T. WINSTON. | |
| D. Captain C. B. WESTERN, 1st Lieut. F. S. CALHOUN, 2d Lieut. H. C. CABELL, JR. | |
| E. Captain F. E. TROTTER, 1st Lieut. J. A. BUCHANAN, 2d Lieut. F. F. EASTMAN. | |
| F. Captain T. F. TOBEY, 1st Lieut. C. A. JOHNSON, 2d Lieut. C. H. MARTIN. | |
| G. Captain C. H. WARRENS, 1st Lieut. W. P. GOODWIN, 2d Lieut. W. A. KIMBALL. | |
| H. Captain S. MCCONIHIE, 1st Lieut. S. J. MULHALL, 2d Lieut. W. R. SAMPLE. | |
| I. Captain G. W. DAVIS, 1st Lieut. F. TAYLOR, 2d Lieut. A. HASBROUCK, JR. | |
| K. Captain G. S. CARPENTER, 1st Lieut. R. A. LOVELL, 2d Lieut. W. K. JONES. | |

Letters with valuable information have been received from Generals E. D. Townsend, W. B. Franklin, T. F. Rodenbough, U. S. A.; Lieutenants J. A. Buchanan and Frank Taylor, 14th Infantry; Colonels, William R. Smedberg, E. McK. Hudson and J. J. Coppinger; Captains A. H. Bainbridge, 14th Infantry, T. M. K. Smith, 23d Infantry, and Geo. M. Downey, U. S. A.; Major P. W. Stanhope, U. S. A.; Captain Chambers McKibbin, 15th Infantry.

I am indebted to the Adjutant of the Regiment, Lieut. R. T. Yeatman, for much diligent research and compilation, also to Captain Tobey and Lieutenant Eastman for assistance, and to the Sergeant-Major and his clerks for intelligent and faithful work.

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HOW OUR BODIES ARE NOURISHED AND THE
PROPER DIET OF THE SOLDIER.*

By W. E. WATERS, SURGEON, U. S. A.

LIFE in the animal kingdom from its simplest form in the amœbia, which is only a homogeneous mass of protoplasm to the complex organisms of higher animal life, which culminates in man, is a series of changes, including growth, decay and death.

The little protoplasmic semi-liquid animalcule to which I have referred as the lowest order of animal life has inherent in it the power of motion—it possesses irritability, one of the characteristics of animal life, and coming in contact with its pabulum, envelopes or flows around it, extracts its nutriment and flows away, which constitutes its whole process of eating, digesting and assimilating. It grows by simple absorption of nutriment, and when it reaches maturity, the cell, for it is nothing more, divides into two, identical with the first, and so the process goes on, dividing and redividing, the older maturing and dying, the younger multiplying.

The same characteristics of growth, maturity, decay and death

*Read before Vancouver Branch, M. S. I., April 8, 1890.

occur in our bodies, though the processes are almost infinitely more complex. In the amœbia the nutriment enters at any part of its body with which it may come in contact, and the portion of it not appropriated as an immediate constituent of its body passes out at any other equally indifferent and most convenient part. It is devoid of digestive apparatus, and does not even contain a cavity for the food.

The higher animals in their complexity of organization cannot be nourished in a way so simple, though the chemical elements which nourish one are identical with those that nourish the other. These consist of oxygen, carbon, hydrogen, nitrogen, and a few metallic substances, the nitrogen being the characteristic element of animal life as carbon is of vegetable life.

The body to be nourished is composed of precisely similar elements. All the natural in it, and all the energy it develops comes from without. The pabulum furnished must contain the relative proportion of the nutrients required by the muscles, brain, nerves, bones, cartilage, tendons, skin and viscera. All these parts are constantly wearing out, and throwing off in destructive assimilation the worn out material, which must be replaced by new, and not only in a quantity to compensate for the loss, but what may be needed for potential energy expended in the production of animal heat and mental and physical exercise.

If a quantity of nutriment is taken and converted into organic products in the body in greater amount than the body throws off in effete material or expands in force, we gain in weight ; but if it is not equal to the expenditures, then the tissues already formed are drawn upon to make up the deficiency and we lose in weight. So there is a constant income and outgo, and when all the elements of the income are sufficient to meet the outgo and the excretory organs are not taxed to rid the body of an excess, there is perfect nutrition.

About 61 per cent. of the body of an average healthy man is water and about 6 per cent. mineral—the latter principally in the bones, of which they constitute nearly one-third.

The remaining 33 per cent. comprises substances known as organic compounds, of which the albuminous principles or *protein* comprise about 18 per cent. and fats 15 per cent. There remains in the body a very small proportion of carbo-hydrates.

While our bodies originate nothing in themselves to nourish or energize they contain mechanisms wonderful in their construc-

tion, and functions for converting the natural aliments into organic compounds that do nourish them.

These consist of the digestive apparatus in which food is prepared for its further diffusion ; of the circulatory system, and the blood, through which there is a rapid distribution of the materials prepared for use by the digestive apparatus ; of the glandular system, for the further preparation of material for nutrition after it has reached the blood, and for removing waste ; of the respiratory organs through which the oxygen is taken from the inspired air to assist in the production of heat and other forms of energy ; and of the nervous system, the most wonderful of all, by which the others are regulated and in which the intellectual faculties have their seat.

Vegetable life derives its nutriment entirely from inorganic principles ; animal life very largely from organic, and is impossible without such. In vegetables the inorganic principles of their nutrients are converted into organic, and when eaten by the animal are again changed in its body into inorganic in the form of carbonic acid. So there is a constant reciprocity going on between animal and vegetable life, each furnishing food for the other.

The nutriment upon which the complex machinery of animal life acts is not supplied in the form in which it enters into the various tissues. We cannot take the oxygen required in the water we drink, which is composed of this element and hydrogen ; but must inhale it in the atmosphere ; nor nitrogen by breathing any quantity of atmospheric air, which contains it also, as a substitute for what we eat in our roast beef ; nor will a powder of diamond dust or charcoal answer for the carbon supplied in the sugar and starch in our vegetable diet, and the fats in our mutton chops and breakfast bacon.

The following are the forms in which nutrients are supplied : The albuminoids and gelatinoids composing the protein or albuminous principles we consume in the form of albumen in eggs, casine in milk, the albuminoids in meat and fish (this constitutes the most important), gluten in flour, and the nitrogenous principles in beans, peas, potatoes, rice, etc. These vegetables, although containing more or less protein, are richer in the carbo-hydrates. Meat and fish contain extractive matters that make them agreeable to the taste, but are devoid of nutriment. The fats we get in the fats of all kinds of meats and

fishes; in the fat of milk, which in the form of butter is almost pure fat; in the vegetable oils, and in fats contained in wheat or rye flour, corn-meal, oatmeal, etc.

The carbo-hydrates, comprising sugar and starch, we eat in the form of sugar, an almost pure carbo-hydrate in rice, which contains about 80 per cent.; in wheat flour about the same; in corn-meal and oatmeal with about 68 per cent., and in potatoes of about 20 per cent. The succulent vegetables contain carbo-hydrates, but in much smaller proportions. They are found also in fruits, but not in such quantities as in the leguminous vegetables I have named.

Added to these water, and a few inorganic substances, as iron, lime, sulphur, phosphorus, etc., constitute all that is needed in our diet.

The necessary inorganic substances are found in the foods I have mentioned, except salt, which must be added.

I have referred to the animal body as being constituted of certain chemical elements; to the change it is constantly undergoing; to the necessity of material from without to replace the waste going on within; and to the adaptability of nature's supplies for the purpose, and to the form in which they are furnished.

Let us now consider how these nutrients are utilized. The wants of the body vary from many causes. The diet of infancy differs from that of childhood; the diet of childhood from that of the adult, and the diet of the adult at rest from that required by labor. A resident of a cold country requires different food from one living in a tropical region, and the food on which one individual will thrive will not always nourish another of similar physique, habits and environment.

The diet of the infant is furnished in the mother's milk in just such proportions of the constituents of the nutritive elements as are adapted for the infant. This diet, already compounded by nature, is the only perfect one. The diet of later periods of life must be from such articles as the intelligence of man has enabled him to select for the wants of his system. Taste and appetite are the chief factors aiding in the selection of our foods. As a rule nature furnishes but few substances readily obtainable by the lower animals, or man, in which taste is not a good guide in selecting and appetite in using. It is a false maxim, "You should rise from the table with a good appetite." Appetite is a

normal condition, hunger an abnormal. Appetite is the pleading of nature for food, hunger her complaint when it is not furnished. The instinct of man with his taste not perverted or appetite stimulated are then good guides in the selection of food.

A preponderance of one kind of diet will not compensate for a deficiency in another except to a limited extent.

The diet of an adult should consist of nitrogenous and non-nitrogenous substances in the proportion of about one to four, so in order to get the necessary amount of food into the body in the form of meat, if we ate that alone, it would be necessary to eat, say of roast beef, about four times as much as would be required if vegetables in some form were eaten with it in order to get a normal quantity of a non-nitrogenous element in the fat.

Lean meat is the principal source of nitrogenous supply, but it is also found in a vegetable diet. The hard bread of the ration contains 15 per cent.—soft bread only about 8 per cent. Oatmeal and beans have about 12 per cent., corn meal and macaroni about 9 per cent., rice 5 per cent., and potatoes 2 per cent.

There are also small quantities of other nitrogenous substances in meat and fish called *extractive matters*. These are not nutritive, but extremely useful in making the articles which contain them palatable. They give to roast beef and broiled steak, to pompino and white fish, to canvas back duck and woodcock their pleasant taste and savory odor, and to beef-tea its invigorating and stimulating properties.

Protein is the most important of all the elementary principles. It is the nitrogenous basis of bone, muscle, tendon, skin and blood. It constitutes over 18 per cent. of the substance of the body. The foods containing it might be called the more stable of the nutrients, for the protein in them remains protein in the body. The behavior of mineral substances is similar, but it is different with others.

The quantity of fat in the body is not dependent on the amount of that substance we eat. A man will starve on a diet of fat alone. From it animal heat is evolved, and its source is principally the carbo-hydrates (sugar and starch) which decompose to form it. This has been demonstrated in experiments on pigs. One of these animals, which had been fed on carbo-

hydrates, was found to have accumulated 472 parts of adipose tissue during the time it had eaten 100 parts of fat.

The fats in the body fill irregularities over muscles, and are deposited in thick layers elsewhere, as over the abdomen of obese persons, and they constitute a large part of the brain and spinal cord. Fat is also interspersed with the muscular fibres, where it is in very small particles, and can be seen only with the microscope. This portion of fat, when absorbed, is replaced by water, so that a man may be growing lean without losing in weight.

The average human body consists of 60.6 per cent. water, 18.2 per cent. of protein, 15.5 per cent. of fats, 5.6 per cent. of minerals, and only .10 of 1 per cent. of carbo-hydrates. In a normal diet, as we shall see hereafter, a man eats nearly three times as much of carbo-hydrates as of protein and fats combined. Why this discrepancy?

These elements are by no means similar to the non-nutritious food of ruminating and other animals, but have most important functions in the animal economy. They are to man what coal is to the engine. Their combustion furnish energy for all the vital functions of the body, and with fats form the source of animal heat so essential to life. The carbo-hydrates then are either burnt up in the body or remain in the form of fat. With this digression from foods, to what they become and what they do, let us return to the consideration of the former.

We take in our food, and drink not less than 70 ozs. of water in 24 hours. Water is not a nutrient, though highly essential to nutrition in dissolving soluble parts of food, and liquefying other parts not soluble, so that they may be taken up in the blood-vessels and lymphatics. It is also necessary in keeping the blood sufficiently liquid, and holding in suspension substances in the secretions and excretions from the body.

The inorganic elements are found in most foods, and salt is the only one that is furnished as a distinct article of diet.

Phosphorus is an inorganic substance found more largely in the brain than elsewhere. Much discussion has arisen as to whether foods containing it are not specially required in the diet of brain-workers. Many scientific men at one time, among them the distinguished Agassiz, claimed that it should be, and recommend fish as a very desirable food for those engaged in intellectual pursuits.

The theory has not been sustained by recent scientific investigations. Mark Twain availed himself of this as a subject for one of his inimitable humorous articles. He writes the following letter to an aspiring author who applies to him for advice :

“YOUNG AUTHOR: Yes, Agassiz *does* recommend authors to eat fish, because the phosphorus in it makes brains. So far you are correct. But I cannot help you to a decision about the quantity you need to eat—at least, with certainty. If the specimen composition you send is about your fair, usual average, I should judge that perhaps a couple of whales would be all you would want for the present—not the largest kind, but simple, good middling-sized whales.”

The fallacy concerning phosphorus food probably arose from the fact that brain-workers are usually persons of sedentary habits, and eat too much rich nitrogenous food. Sir Henry Thompson remarks on this subject as follows :

“The value of fish to the brain-worker” is on the ground that it “contains in smaller proportion than meat those materials which, taken abundantly, demand much physical labor for their complete consumption, and which without this, produce an unhealthy condition of body more or less incompatible with the easy and active exercise of the functions of the brain.”*

We have considered the kinds of nutriment the body in health requires, whence obtained, and how appropriated, and shall now speak of the quantities of foods necessary under different circumstances. No absolute rule can be given to determine the amount of nutriment an individual requires. It varies in different individuals as much as the individuals vary in their physical conformation. Nor is there any rule based on size, age, temperament, constitution or occupation that is general in determining this question. Dietaries are calculated on a system of averages, and in large numbers of persons the aggregates vary so little that in following one carefully prepared there is seldom a waste or a deficiency in any of the articles composing it. The larger quantities consumed by some compensate for the smaller by others. A perfect diet is, in quantity and kind, that which so conforms to nature's requirements that in a healthy body all its nutriment is appropriated in making tissue or furnishing energy. A deficiency in quantity involves a draft on the tissues already formed, and an excess imposes additional labor on the secreting and ex-

* *Century*, July, 1887, page 251.

creting organs, causing disease. We have frequent examples of the latter in the kidney diseases of high livers, arising from the increased labor of these organs in ridding the blood of an excess of nitrogenous products resulting from over-eating.

The object of established rations for armies, and dietaries for other large bodies of people, is to furnish food in such quantities and of such kinds as are most productive of health and vigor at the least cost. In these the values of foods as tissue making and force producing are considered. Experiment and observation have pretty well determined the average amount of food required for man in a state of rest or quietude, and while performing moderate and laborious work. Different degrees of muscular exertion require different amounts of pabulum to sustain the body under it. If violent, and no more food is taken than during moderate exertion, then the fat already in the body is burnt in furnishing energy, fatigue follows, the body loses in weight.

I have already referred to the general division of foods into nitrogenous and non-nitrogenous—one tissue making the other energy liberating.

I will here call your attention to a most interesting and instructive series of articles in the *Century* for 1887, on the chemistry of foods, their nutritive value, potential energy, digestibility, etc., with descriptions in detail of experiments of recent date that have determined many important questions on the interesting subjects of which they treat. I am indebted to these for much assistance in preparing this lecture.

TABLE OF NUTRIENT MATERIALS AND REFUSE IN COMMON FOOD.*

Articles.	In 100 Parts.					
	Protein.	Fats.	Carbo-hyds.	Minerals.	Water.	Refuse.
Beef, side, well fattened.....	13.6	22.	....	I	43.4	20.
Beef, round, rather lean.....	21.	8.	....	1.5	59.5	10.
Beef, sirloin, rather fat	15.	14.	....	1.	45.	25.
Mutton, side, well fattened...	13.5	23.	....	1.	42.5	20.
Mutton, loin, (chops).....	12.5	29.5	...	1.	41.	16.
Smoked ham.....	14.6	33.9	....	1.	36.	14.5
Pork, very fat, salted.....	2.7	76.3	....	1.	9.5	10.5
Turkey, medium fatness.....	15.5	5.5	....	1.	42.5	35.5
Brook trout, whole.....	9.5	1.	....	.8	40.	48.7
Mackerel, whole, average....	10.	4.5	...	1.	39.5	45.
Salmon, whole.....	14.6	8.7	....	1.2	40.	35.5
Salt codfish.....	16.	5.	....	1.4	39.7	42.4

*Calculated from Atwater's diagram in *Century Magazine*, May, 1887.

In 100 Parts.

Articles.	Protein.	Fats.	Carbo-hydrts.	Minerals.	Water.	Refuse.
Hens' eggs.....	11.6	9.9	.6	.9	63.	14.
Oysters, average... ..	6.	1.	3.5	2.5	87.	....
Cows' milk	3.5	3.5	4.5	1.	87.5	....
Cheese, whole milk.....	27.4	35.1	2.3	4.	31.2	....
Butter.....	1.5	86.5	.8	2.2	9.	....
Oleomargarine.....	....	87.	.8	2.5	9.7	....
Lard.....	....	98.6	....	....	1.4	....
Wheat bread.....	8.7	2.	55.3	1.3	32.7	....
Beans.....	23.4	2.6	57.	3.6	13.4	....
Oatmeal	15.	7.	68.4	2.	7.6	....
Corn (maize) meal	9.	4.	70.6	1.9	14.5	....
Rice	7.3	.7	79.	.5	12.5	....
Sugar .....	....	....	97.	1.	2.	....
Potatoes	2.	.1	20.9	1.	76.	....
Turnips	1.	....	7.	.9	91.1	....
Cabbage.....	1.9	....	7.1	1.	90.	....

The nutritive value of food is not alone its standard of merit. Very nutritious substances are often very indigestible, as, for example, cheese, which contains twice as much of the nitrogenous element and more than twice as much fat as roast beef; but it can be eaten in only small quantities.

I shall now enumerate some of the more common foods, and refer to the characteristic features of each.

Milk, as I have said before, is the ideal food of infancy, but is not a suitable, exclusive, diet for the adult, as it does not contain the proper proportions of the several nutrients, and is not adapted for the occupations of that period of life, nor is it as easily digested by the healthy adult as by the infant.

The relative proportions of the different ingredients in milk differ in different animals. For instance, the cream in the milk of the Jersey cow is so out of proportion to that in the milk of the long-horned Texas bovine that one would not suspect from their composition that the milks were from animals of the same species.

Milk is an excellent diet for the sick, whose stomachs will often digest it better than any other food.

A much more important and generally used diet is *butter*, that valuable substance obtained from milk. When eaten with bread, in addition to its nutritive value its palatable taste enables us to eat a large quantity of the bread.

Oleomargarine is almost identical with butter, and of very

nearly the same nutritive value. It is made by extracting the stearin from the fat of beef or from lard, and adding a small amount of butter, which gives its flavor to the whole. The popular prejudice against the article has deprived many a poor family of a wholesome and agreeable food.

Eggs are composed of nitrogenous, fatty and mineral substances, and are therefore both tissue-making and heat-producing food. They are easily digested, and contain a concentrated nutriment.

Meat is the most universal article of man's diet. The flesh of a few domesticated animals, including birds, and other fowls, constitute the varieties of meats in our every-day use. They are cooked to prepare them for the table, but recent experiments have demonstrated that, except with very tough meat, the process of cooking is more to make it toothsome than of aid in making it digestible.

Of the several methods of cooking *roasting* retains the flavor and renders meat more digestible than any other. The old English way of suspending a joint of beef before an open fire in the fresh air, is *the* method of cooking meat *par excellence*; but it has fallen into disuse, both in this country and where it originated. *Broiling* is similar to roasting as regards the heat effects. It is adapted only to meats cut in slices, as steaks and chops. Our roasting is the English baking, and ranks next after broiling. Roasting, broiling or baking should be with a hot fire, so as to coagulate a film of albumen on the surface, thus retaining the agreeable extractive matters, which are volatile. *Boiling* is not so good a method except for salt meats. When adopted, the water should be very hot, so as to act on the surface of the meat in the way dry heat acts in roasting or baking or broiling. In making soups, however, the meat should be put into *cold* water, and the temperature raised gradually, so that the juices may be thoroughly extracted.

Stewing is an excellent way of cooking meat, particularly if tough. A small quantity of water is used, and all the juices, both nutritious and savory, are preserved in the stew. This method is vastly preferable to boiling. The latter should be resorted to only when the water in which the meat is boiled is used as soup.

Frying is a method that should never be adopted when any other way of cooking meat is possible. It is a suitable way

of cooking small fish and a few other articles. Overcooking meat renders it less digestible.

The time required for digesting meats varies with the kind of meat and the mode of cooking. Raw beef is digested in two hours, a shorter time than when cooked in any way, broiled, rare, $2\frac{1}{2}$ hours; well done, in 3 hours; roasted, rare, 3 hours; well done, 4 hours. Roast veal requires about 4 hours and roast fresh pork an hour longer.

The concentration of nutrients, either animal or vegetable, into compact forms is more useful as a matter of economy, convenience or expediency in emergencies, than as a promoter of health. Many military critics claim that the success of the German army, in the Franco-Prussian War of 1870, is as much attributable to the sausage makers of Berlin as to the strategy of its generals. Their field ration in the form of sausage enabled the German armies to move with little transportation and great celerity.*

Tough meat is not thoroughly masticated, or digested, and portions of it containing nutriment pass out of the bowels as excretion. Fluids and semi-fluids are more digestible than solids. The meats of young animals, with the single exception of veal, are more digestible than the meats of older animals.

The more nutritive vegetable foods are the *cereals*, which contain all the alimentary principles. *Wheat flour* is a more universal article of diet than any other.

Indian Corn, in the form of meal, is a staple article of food in our Southern States. It contains about the same proportion of carbo-hydrates, more fat, and less protein than wheat flour.

Rye, *buckwheat*, *oats* and *barley* are ground into flour, and eaten in the form of bread and mush. Of recent years a popular vegetable food of Scotland has become more common in this country, and the coming generation is likely to be more robust from the growing popularity of oatmeal.

Rice is a common article of diet, but is not as much appreciated as it merits.

Beans and *peas*, in addition to their carbo-hydrates, contain a large percentage of protein and make a very useful and economical diet for laboring people. They constitute an important part of the Army ration. With the addition of fat pork or bacon

* Encyclopædia Britannica, vol. 7, page 202.

they make a very nutritious diet. The pork and beans of New England has become a popular dish even in the land of hog and hominy. These two common diets in the North, and in the South, are about equally nutritious. Beans and peas cannot be used constantly as some other vegetables, particularly by persons leading inactive lives, as they become unpalatable, and cause indigestion.

The potato, of all vegetables, is the most appreciated, though it contains but 20 per cent. of carbo-hydrates and a little protein, while rice contains more protein and very much more of carbo-hydrates. Their relative nutritive value is misleading, without reflection. Ounce for ounce, the dry rice is twice as nutritious as potatoes, but in cooking rice the water it absorbs makes the boiled article about equal in nutritive value with the same quantity of boiled potatoes, which in their natural state contain so much water that little is absorbed in cooking.

The green vegetables of a truck garden, such as cabbage, turnips, onions, beets, tomatoes, green peas, string beans and lettuce are all composed largely of water, and contain but little nutriment.

The most important of the inorganic foods is *salt*, which, in addition to its use in forming tissue, enters into a chemical combination in the stomach, forming hydrochloric acid, a very essential constituent of gastric juice.

The other inorganic principles, such as phosphorus, iron, lime and sulphur, abound in the organic foods I have enumerated. There are other substances, known as "accessory food," such as pepper, mustard, vinegar, etc., which improve the taste, and, in proper quantities, aid digestion, but their excessive use is harmful to the mucous membrane of the stomach. To this class may be added coffee, tea and chocolate, and also distilled and fermented liquors.

The division of aliment into food and drink is improper. Some liquids, as cream, are very rich in nutrients. Whether they contain nutriment or not, liquids, when used as adjuncts to other aliments, constitute food. Let us now consider how these foods may be combined, and in what proportions to best subserve the nutrition of man.

I have referred to the body as made up of certain elementary principles, and to the fact that it must be nourished by food containing these. I have classified foods into two general

classes of nitrogenous and non-nitrogenous, and have enumerated the common foods of the three natural kingdoms.

I shall now consider how we can best combine and utilize the most useful of these. In doing so I do not propose to discuss the elaborate *ménù* of a fashionable dinner, the object of which is not to serve such articles, and in such quantities, as are most conducive to health, but rather to make such combinations and successions of dishes as will gratify the palate for the longest possible time, aided by wines as varied as the foods, until the stomach can hold no more, regardless of the consequences to the liver and kidneys, and the discomforts of the following day.

I shall consider what foods are best as the common diet of man, and particularly of that class who must count the cost. This will include the rations of the soldier, in the selection of which the two principles—the cost and the healthfulness of the diet are most important.

A constant diet of one article will always, after a time, become distasteful. Hence it is desirable to know what foods furnish the most nutriment, and what nutritious foods can be eaten in proper quantities for the longest time. This is an important consideration for Army officers, particularly company commanders, in arranging the diet of their men, not only as regards the ration, but in the purchases they make from their company funds.

The occupation of a man determines largely how much and what kind of food he should eat. I have arranged the following table showing the quantities of the nutrient principles of food required by an adult man under different circumstances, and in different occupations.

NUTRITIVE ELEMENTS IN DIFFERENT DIETS.

	Protein.	Fats.	Carbo- hydrates.
	ozs.	ozs.	ozs.
Bare existence diet of London prisons (3 weeks). . . .	2.	6.	14.7
Hindu prison labor diet.	2.	0.60	19.83
Diet of quietude (Playfair).	2.5	1.	12.
Dobell's moderate labor diet.	3.5	3.3	10.7
German labor diet.	4.2	2.	17.6
U. S. Army ration.	4.	3.91	13.47
French Army ration (in time of peace).	4.33	1.25	18.04
“ “ “ (in time of war).	4.58	1.23	18.75

	Protein.	Fats.	Carbo- hydrates.
	ozs.	ozs.	ozs.
German Army ration (smaller ration)	4.8	1.1	17.4
“ “ “ (larger ration)	5.7	1.4	18.6
Austrian Army ration (in time of peace)	3.7	1.6	17.0
“ “ “ (in time of war) (mean). . .	4.5	3.2	22.8
Russian Army ration	5.8	1.0	25.0
Prize fighters training diet	9.8	3.1	3.27

You will observe in these diets the great difference both as to quantity and kind. The prison diet is one, on which, it is supposed a man can live for the period of three weeks, without in the least endangering his health. This is given only when the prisoner is in confinement.

Playfair, who has given much attention to this subject, thinks that a man may live in good health for a long time on his “diet of quietude,” but he must avoid muscular or mental exercise. In this connection it is well to remember that there is no such thing as *absolute rest* of the muscular system during life. The involuntary muscles concerned in breathing and the heart are in constant use, and their waste, as well as the force required in their movements must be supplied by food.

In proportion to the degree of muscular exertion should be regulated the quantity of aliment a man should eat. No class of people have this law of nature's demands more strikingly demonstrated to them than army officers on a long march with troops. We see how insufficient is the ordinary diet of garrison life for the wants of the soldier under such circumstances.

In the quantities of the alimentary principles of food, given in the table, you will notice that in all the army rations, and in the German labor diet this fact has been well considered. The importance of the nitrogenous elements seems to have been realized in arranging all of them. In the larger ration of the German Army, and in that of the Russian Army the protein element is larger than in the others, but in them there is a corresponding reduction in fats and an increase again in the carbohydrates, thus making their nutritive values not dissimilar. Carbo-hydrates we have seen are converted into fats in the body, and protein is also, when there is an excess. An illustration of how a change of kind and quantity of food will affect laboring men, in a warm climate, where it is supposed an animal diet is not essential, is the following :

“In building a railroad in Sicily, where the work was done by gangs of natives, and corresponding gangs of English workmen, the difference in the amount of labor performed by the two classes was so great that the contractor, in order to get more work done by the Sicilians, who ate little or no meat, to save expense of living, adopted the plan of paying the workmen partly in meat and partly in money, which resulted in the Sicilians performing an amount of work nearly equal to that of the English.”*

The prize-fighter expects his strength and powers of endurance to be at their maximum when he enters the ring, and for several weeks preceding the contest he has a very different diet from that of his ordinary life, consisting of such food as goes to make muscular fibre. Only as much fat is eaten as is required to be consumed in furnishing energy and animal heat, and that he gets in his meat. Not a superfluous ounce is allowed to accumulate in his body. Such a diet is practicable only during the training period. If the protein in the large quantity of meat were not converted into muscular tissue, it would be eliminated as an excrementitious substance, to the injury of the secreting organs. Hence the most systematic training of the muscular system goes on while he is using this highly nitrogenous diet.

Let us now consider the quantities required of the several foods.

I have prepared in tabular form several dietaries arranged by Dr. Horace Dobell, of London, with a view of showing the different kinds of foods that furnish the same amount of nourishment, with the calculations of the quantities of the different elements in each, and in connection with them have given the rations of our Army, the English and the Italian armies.

The Italian ration is selected to be given in detail in this table as showing a different variety of diet from that of any other European army, and in contrast with the English Army. Dr. Dobell's tables you see are arranged with reference to the tastes and means of different individuals, specifying different articles of the same nutritive value, but varying in cost. Any one of the six he thinks will furnish the amount of nutriment a healthy man, taking moderate exercise, will require, adapted to persons of different constitutions and occupations. The good liver may arrange his bill of fare after

* *Encyclopædia Britannica*, vol. viii., p. 202.

diet table No. 1. The poor man of a calling requiring little muscular exercise, may arrange his after table No. 4, substituting at times the cheaper meats for fish. Individual tastes cannot be consulted in arranging dietaries for large numbers of men, when the cost and other circumstances must be considered. This is particularly the case in providing uniform rations for armies. In them, when peculiarities of taste are gratified, it must be at the expense of the soldier, or to some extent in our Army by purchase of articles by the company commander from the company fund. This is practicable only to a limited extent.

There always has been, and I suppose there always will be, as long as we have an army, discussions as to the sufficiency and adaptibility of the soldier's ration. Theoretically the ration is sufficient. Practically, also. But a never failing desire on the part of some captains to accumulate large company funds, which they seem to consider as important as the proper feeding of their men, is not as uncommon as it should be, and gives rise to just complaint. The several constituents of the ration have been selected with a view to supplying the wants of the body of the soldier, on the principles I have explained. This has not been determined by chemical analysis and physiological research, by test-tubes and reagents, by retorts and spirit lamps, by delicate balances, by thermometers and calorimeters, by calculating how many foot-tons the combustion of a pound of fat will raise, or by experiments on innumerable dogs and other animals; *but by actual experience and observation*. The essentials of the ration were used before recent research demonstrated *how* they were so useful.

The nutritive value of our ration is in excess of that of other armies, and it is sufficiently varied to make some allowance for taste. The number of interchangeable articles in it is unusual. We have bacon or salt pork, fresh beef or mutton, canned fresh beef or salt; two kinds of wheat bread, or wheat flour or corn meal; beans and peas, rice or hominy; coffee, tea, sugar, salt, pepper and vinegar.

When the Army was scattered over remote and isolated posts in a country of hostile Indians, some of them more than a thousand miles from their depots of supply, and these posts furnished *annually* with subsistence stores, the ration, as a selection of nutritious, palatable, portable, and imperishable articles of food, could not have been much improved.

Situated as the Army is now with comparatively few posts remote from railroads, I think the addition of such fresh vegetables as potatoes and onions to the ration should be made, and not have the soldier look for his supply of these articles to the precarious yield of gardens (particularly post gardens as I have observed them), or the more precarious reliance on company savings for their purchase.

In proportion to the amount of fresh vegetables that may be added to the ration other parts, furnishing similar nutriment, may be withdrawn from it.

I would recommend that in lieu of the present ration, with its many interchangeable articles, two more restricted rations be adopted—one for garrison life and the other for field service.

The quantities and kinds of food appropriate for men on these different duties vary, and I think a saving of expense, besides furnishing more suitable food, would result from the change. Fresh beef cannot always be bought on the march, and most company commanders prefer hard bread to flour in the field. Bacon is sparingly used in garrison; hard bread never.

I would suggest that the garrison ration be made to consist of 20 ozs. of fresh beef, as at present, or 16 ozs. of corned beef (not the *salt beef* as formerly issued), in the proportions of four rations of the former to one of the latter; of 16 ozs. of flour, or soft bread, instead of 18 ozs.; of 18 ozs. of corn-meal, instead of 20 ozs.; of 10 ozs. of potatoes, or 4 ozs. of onions, and of 1 oz. of rice or hominy. The other accessory articles of the present ration to be incorporated in the quantities they are now issued. For the field ration I would suggest 14 ozs. of bacon or pork, instead of 12 ozs.; 18 ozs. of hard bread, instead of 16 ozs. or 18 ozs. of flour; 3 ozs. of beans or peas, instead of 2.4 ozs.; rations of coffee, sugar, salt, pepper, candles and yeast powder in same quantities as in present ration.

The allowance of fresh beef for garrison I believe to be ample. Beef, if properly corned shortly before using, and not the "salt horse," so called in war times (the soldier's name for the execrable salt beef then furnished), I think is an excellent food. It could be obtained, recently corned, from the beef contractor in the same way that fresh beef is furnished. It would make a good dinner meat once in five days, and excellent hash for breakfast the following morning.

Sixteen ounces of flour is ample if potatoes are furnished also. I believe it more conducive to economy to furnish only what is necessary, notwithstanding the fact that the money value of any surplus is divided among the companies for improving the diet of the men. Corn-meal is seldom or never issued, but it should be, and the quantity might properly be reduced.

Ten ozs. of potatoes or 4 ozs. of onions are added. I think there is but one opinion among officers serving with troops as to the advisability of this addition. There may be differences of opinion as to the quantity needed. I would strike out beans and peas, but retain rice and hominy as now issued. I would not depreciate the value of beans as a soldier's food, but think the substitution of potatoes and onions desirable. Beans are inexpensive, and the small quantities used in garrisons, when fresh vegetables are furnished, could be purchased, as potatoes and onions now are, when not raised in the gardens at the post. Hominy I regard with great reverence in recollection of my early life, when coarse hominy was served on my father's table with almost the regularity of potatoes, boiled for dinner, and what remained was fried for the next morning's breakfast. I have adopted the diet in hospital, and it seems very satisfactory to convalescent patients. If properly cooked it is almost always appreciated.

RATION OF THE ENGLISH ARMY.

		Water.	Albuminates.	Fats.	Carbo-hydrates.
		ozs.	ozs.	ozs.	ozs.
Meat, fresh (less $\frac{1}{5}$ bone) ..	16 ozs.	9.30	1.86	1.04	....
Bread.....	20 "	8.	1.60	.30	9.84
Or biscuit.....	16 "	....	....	....	....
Vegetables, fresh.....	8 "	6.40	.14	.01	1.36
Or vegetables preserved...	2 "	....	....	....	....
Or rice or peas.....	2 "	....	....	....	....
Sugar.....	2 "	.06	...	....	1.93
Tea.....	$\frac{1}{6}$ "	....	....	....	...
Coffee.....	$\frac{1}{3}$ "	...	....	....	....
Salt.....	$\frac{1}{2}$ "	....	..	....	....
Pepper.....	$\frac{1}{36}$ "	....	....	....	....
Lime juice { when fresh vegetables are not issued. }	1 "	....	....	....	....
Rum.....	$\frac{1}{2}$ gill	....	....	....	....
		23.76	3.60	1.35	13.13

RATION OF THE ITALIAN ARMY. (No. 1.)

	Water.	Albuminates.	Fats.	Carbo-hydrates.
	ozs.	ozs.	ozs.	ozs.
Meat, fresh (less $\frac{1}{8}$ bone). 5.29 ozs.	3.17	.63	.35	....
Bread.....32.37 "	12.94	2.58	.48	15.92
Bacon......52 "	.07	.04	.38	....
Pastry (macaroni, etc.).. 7.05 "	.92	.63	.02	5.41
Vegetables..... 1.76 "	1.40	.03	.003	.29
Salt and pepper..... .70 "	....	....	....	....
	18.50	3.91	1.233	21.62

RATION OF THE ITALIAN ARMY. (No. 2.)

	Water.	Albuminates,	Fats.	Carbo-hydrates.
	ozs.	ozs.	ozs.	ozs.
Meat, fresh (less $\frac{1}{8}$ bone). 5.29 ozs.	3.17	.63	.35	....
Bacon......52 "	.07	.04	.38	....
Corn meal.....24.68 "	3.70	2.22	.98	17.28
Vegetables..... 2.64 "	2.11	.04	.005	.44
Cheese..... 1.16 "	.42	.38	.28	....
Salt and pepper. 1.41 "	....	....	....	....
	9.47	3.31	1.995	17.72

RATION OF THE ARMY OF THE UNITED STATES.

	Water.	Albuminates.	Fats.	Carbo-hydrates.
	ozs.	ozs.	ozs.	ozs.
Bacon...12 ozs. $\frac{3}{10}$ of..	.54	.31	2.63	....
Or fresh beef (or mutton)				
(less $\frac{1}{8}$ bone 20 ozs. $\frac{7}{10}$ of.	8.40	1.68	.94	....
Or salt beef.....22. ozs.	....	....	....	....
Soft bread or flour 18. "	7.20	1.44	.27	8.85
Or hard bread...16. "	....	...	....	...
Or corn meal...20. "	....	....	....	....
Beans (or peas)..2.4 "	.31	.57	.07	2.31
Or rice or hominy.1.6 "	....	....	....	....
Coffee, green....1.6 "	....	....	....	....
Or coffee, roasted				
and ground...1.28 "	....	....	....	....
Or tea.....32 "	....	...	....	....
Sugar .....2.4 "	.07	....	....	2.31
Vinegar.....32 gill	...	....	....	....
Salt.....64 ozs.	....	...	....	....
Pepper.....04 "	....	....	....	....
	16.52	4.00	3.91	13.47

TYPICAL DIETARIES.

(Dobell's Tables of Normal Diets.)

FOODS.		Water.	Protein.	Fats.	Carbo-hydrates.
		ozs.	ozs.	ozs.	ozs.
Meat poultry or game*	6 ozs.	3.97	1.35	.53	....
Fish	4 "	3.19	.66	.03	....
Bread	10 "	4.20	1.00	.07	4.53
Potatoes	8 "	5.81	.14	....	1.84
Rice	2 "	.18	.10	.01	1.63
Sugar	2½ "	...	...	...	2.50
Butter	2½ "	....	...	2.50	..
Milk	5 "	4.34	.25	.18	.21
Coffee	16 "	15.77	....	....	.22
Tea	16 "	15.95	....	....	.05
		53.41	3.50	3.32	10.98
No. 2.					
Meat, poultry or game	8 "	5.29	1.80	.71	..
Bread	12 "	5.04	1.20	.08	5.44
Potatoes	12 "	8.71	.20	....	2.76
Butter	2 "	....	....	2.	....
Sugar	2 "	....	....	....	2.
Milk	5 "	4.34	.25	.18	.21
Chocolate	16 "	15.20	.07	.32	.38
Tea	16 "	15.95	....	....	.05
		54.53	3.52	3.29	10.84
No. 3.					
Bread	18 "	7.56	1.80	.12	8.15
Cheese	3½ "	1.28	1.07	.89	.08
Bacon	3 "	.76	.25	1.08	....
Sugar	1½ "	....	....	....	1.50
Milk	5 "	4.34	.25	.18	.21
Chocolate	20 "	19.00	.10	.40	.50
Tea	20 "	19.93	....	....	.07
		52.86	3.47	3.55	10.51
No. 4.					
Fish	8 "	6.38	1.33	.06	....
Bread	16 "	6.72	1.60	.11	7.25
Potatoes	8 "	5.81	.14	....	1.84
Butter	2½ "	...	....	2.50	....
Milk	8 "	6.94	.40	.28	.34
Cocoa	20 "	19.10	.10	60	.20
Sugar	1½ "	....	....	....	1.50
		44.95	3.57	3.55	11.13

*The meats in Dobell's tables are cooked and contain larger proportions of nitrogen as elements and less water than the uncooked meats in the other dietaries.

		Water.	Protein.	Fats.	Carbo-hydrates.
		ozs.	ozs.	ozs.	ozs.
No. 5.					
Bread.....	16 "	6.72	1.60	.11	7.25
Peas.....	3 "	.41	.65	.04	1.40
Bacon.....	4 "	1.14	.33	2.50	....
Cheese.....	2 "	.73	.61	.51	.05
Milk.....	8 "	6.94	.40	.28	.34
Coffee.....	20 "	19.71	...	....	.28
Sugar.....	1 "	....	...	....	1.00
		<hr/>	<hr/>	<hr/>	<hr/>
		35.65	3.59	3.44	10.32

No. 6.					
Milk.....	40 "	34.68	2.00	1.40	1.68
Rice....	4 "	.36	.20	.02	3.26
Eggs.....	3 "	2.15	.45	.32	....
Sugar.....	2½ "	...	....	....	2.50
Butter	1 "	....	...	1.00	....
Bread.....	9 "	3.78	.90	.06	4.08
		<hr/>	<hr/>	<hr/>	<hr/>
		40.97	3.55	2.80	11.52

I would make the field ration to consist of 8 ozs. of bacon and 6 ozs. of canned corned beef, or 20 ozs. of fresh beef; 18 ozs. of hard bread, or 20 ozs. of flour, 3 ozs. of beans or peas, with the accessory articles the same as in present ration.

Eight ozs. of bacon, of the kind issued to troops, with 6 ozs. of canned corned beef is not too much for a soldier on the march or in camp. Salt meat is not desirable as a constant diet, even in the field. Fresh beef should be authorized as an occasional substitute in the quantity of the present ration when it can be purchased and issued judiciously. When fresh beef is bought on the march or in camp there is usually great waste, it is a too common practice to buy more than will supply the immediate wants of the soldier, and he is allowed to gorge himself with a ration or two at a meal; or the excess will be cooked to save it, when it soon becomes unpalatable or uneatable. Let bacon be regarded as the standard and fresh beef as an extra to substitute for it when it can be had in quantities for immediate use. Considering the breakage in handling hard bread, and the increased demand for this, and all other foods on a march, I think the increase recommended reasonable. The necessity for an increase in the field ration was so manifest during the late War, that by an act of Congress the flour was increased from 18 to 22 ozs. and hard bread from 12 to 16 ozs. and an addition of one pound of po-

tatoes was allowed, when practicable, and when they could not be furnished the money value was added to purchase some other proper food. I would leave it discretionary with the commissioned officer to issue flour instead of hard bread when there are facilities for cooking.

Beans is the ideal food of the soldier in the field, and the allowance of them might very properly be increased the fraction of an oz. I have recommended.

The distinguishing features of the changes recommended are the addition of potatoes and onions in lieu of beans and peas, and the reduction in flour in the garrison ration, and the addition of corned beef, making with bacon an increase in the salt meat, and a small increase in beans, and omitting peas, salt pork and flour in the field ration.

PROPOSED GARRISON RATION.

	Water.	Protein.	Fats.	Carbo-hydrates.
	ozs.	ozs.	ozs.	ozs
Beef, fresh, 20 ozs. (less bone) of.....	9.60	1.92	1.07	....
Corned beef, 16 ozs. of.....	1.28	1.28	.48	....
Soft bread (or flour) .....16 ozs.	6.40	1.28	.24	7.87
Or corn meal.....18 "	....	....	...	....
Potatoes.....10 "	7.40	.20	.01	2.10
Or onions.....4 "	....	....	....	....
*Accessory articles same as in present ration.	—	—	—	2.31
	24.68	4.68	1.80	12.28

PROPOSED FIELD RATION.

	Water.	Protein.	Fats.	Carbo-hydrates.
	ozs.	ozs.	ozs.	ozs.
Bacon.....8 ozs.	1.20	.70	5.86	....
Canned corned beef.....6 "	2.40	2.40	.90	....
Hard bread.....16 "	1.28	2.49	.20	11.74
Or flour.....20 "	...	....	....	....
Beans.....3 "	.39	.72	.09	1.66
†Accessory articles same as in present ration.	—	—	—	2.31
	5.27	6.31	7.05	15.71

Dr. Parks in his works on hygiene recommends that the extract of meat be made an extra ration for the English Army to be issued as follows :

After a rapid march on the eve of battle, when there is no

* Coffee, tea, salt, pepper and vinegar not calculated.

† Coffee, tea, salt, pepper and vinegar not calculated.

time for preparing food. A small quantity mixed with red wine will restore strength wonderfully. Water can be used as a substitute for wine.

After a march in rainy weather made into hot soup will prevent bad consequences.

After an action it is invaluable to be carried about the field and given to the wounded before they are taken to hospital. He recommends that it be carried in small pots containing enough for ten or twenty men.

The suggestion is a most excellent one. But extracts, of which there are many varieties, might be furnished for the use of our troops in any one of the emergencies.

It is a part of the hospital supplies of our Army, but not furnished in quantities for such general use, and should be provided by the Subsistence Department for use in the field on the recommendation of medical officers.

At most military posts, where canteens have been established, the profits from them, together with the entire savings of the post bakery, which now go to the company funds, furnish money, with which company commanders can purchase additional subsistence for their men, even should there be no savings from the ration. The judicious expenditure of funds thus accruing will secure an improvement in the company dietaries. This has been done already at this and, I have no doubt, at all other well-conducted posts. In examining the lists of articles purchased with the company funds here I find that they very generally consist of such useful and proper food as fish, oatmeal, canned tomatoes and corn, dried fruits, macaroni, cheese, and many others. When potatoes, onions and cabbages are not raised at the post they constitute the bulk of purchases.

While there are improvements that may be desired, I think I may safely state that there is not an army in the world so well fed without any draft on the private funds of the soldier as the Army of the United States.

THE SUPPLY OF INFANTRY AMMUNITION ON THE FIELD OF BATTLE.

BY LIEUT C. L. BECKURTS, U. S. A.,

SIXTH INFANTRY.

IT is certain that in future actions, offensive or defensive, there will be many motives inducing long range and incessant fire action, and the problem of providing infantry soldiers with a great quantity of ammunition so that immediate use can be made of it, is a very important one.

It is absolutely necessary that each combatant soldier should have at his disposal a number of cartridges sufficient to carry out the services which are expected from the weapon he carries. Whatever the necessary supply may be, it is carried partly on the soldier, partly on wagons, carts, or pack animals, as may be most suitable to the country and enemy, and this supply must closely follow its battalions into action as far as is compatible with its safety. Besides this, a general supply of ammunition is distributed among the divisions and army corps.

The complex question is, how to bring the ammunition carried in the wagons, carts, etc., into direct contact with the individual soldier while in action. It is self-evident that an increased lightness in the ammunition itself will increase the supply carried by the soldier, and thus facilitate the prolonging of the fire action.

In the German Army each soldier carries 100 rounds. The company baggage-wagon carries 2880 rounds, giving 11.5 rounds per man. As this wagon does not generally follow the company to the battle-ground, this supply is not readily available, and is meant to fill up the pouches only during a halt, and when no other supply is available.

With each battalion are four company ammunition wagons. These wagons are drawn by four horses, and carry in all 38,400 rounds, in forty boxes of 960 cartridges each, or 38.4 rounds per man. The cartridges are distributed by means of canvas bags, six per wagon, each holding 500 rounds. Two or three men from each company are with its wagon to bring the ammunition to their respective companies. Two non-commissioned officers

and two privates are attached to the ammunition columns and taught how to conduct the wagons and keep them properly maintained.

Each army corps of 25 battalions contains four small-arm ammunition columns, each of 21 wagons (as above) for cartridges, 1 battery wagon, 1 forge, and 1 baggage-wagon.

The infantry ammunition column is further sub-divided into two divisions, one consisting of 12 ammunition wagons only, the other of the remaining wagons.

The ammunition columns of an army corps are divided into two échelons. The first échelon marches near the troops and forms a part of the fighting body; the second échelon marches with the trains in rear.

The second échelon supplies the first, and in turn receives its supplies from a mobile field ammunition park in rear, or from a stationary depot. Each échelon supplies 30 rounds per man.

In the French Army each soldier carries 78 rounds.

A 4-horse ammunition wagon is attached to each battalion, containing 18.144 cartridges, or 18.1 rounds per man. These wagons are similar in construction to our artillery caissons. Each chest contains 36 canvas bundles, furnished with a handle. The bundles contain 28 packages of 6 cartridges each. Each of these wagons is provided with 12 canvas wallets for carrying ammunition to the firing line. The drivers are taken from their respective battalions.

The artillery has charge of the army corps ammunition park, which is divided into two échelons.

The first échelon is divided into 6 sections, the first two carrying the infantry ammunition, 46.4 rounds per man. The second echelon consisting of 4 sections, carries 33 rounds per man. The first three sections carry the infantry ammunition. Following in rear marches the army park, consisting of 5 similar échelons, for the intermediate supply between the fixed depots and the army corps parks. Each of the two sections (for infantry ammunition) of the first échelon of the army corps park, consists of—

- 32 4-horsed ammunition wagons.
- 1 4-horsed forge wagon.
- 1 6-horsed forage wagon.
- 3 2-horsed provision wagons.
- 1 4-horsed battery wagon.

Total. 38 wagons in a section.

The personnel for each section is : 1 captain, 2 lieutenants, 1 quartermaster, 6 assistant quartermasters, 1 chief artificer, 1 quartermaster-sergeant, 6 foremen, 1 master and 2 assistant farriers, 2 blacksmiths, 2 carpenters, 6 pyrotechnists, 2 harness makers, 2 trumpeters, and about 150 drivers.

If the French require such an enormous force to conduct a train of 38 wagons, we have nothing to learn from them in that respect.

The Austro-Hungarian, Russian and English armies échelon their ammunition supplies in very much the same manner, all differing, however, in the way the ammunition is distributed in the different échelons.

The Russians have substituted for the company ammunition wagons, 2-wheeled, 1-horse carts, 16 carts for the 16 companies, and a regimental reserve of 17 carts. The regimental ammunition train is formed in two groups, one of 8 carts, which marches immediately in rear of the troops. The second group consisting of the other 8 carts and the regimental reserve marches in rear of the column.

The English assign to each battalion four 2-horsed, 2-wheeled ammunition carts. Each of these carts is accompanied by two pack animals. Pack animals can be substituted entirely for the carts, and it is found that each animal can carry 1200 rounds.

In all these armies the battalion and other supplies form successive magazines of ammunition. Beyond the ammunition carried in the army corps columns there can be no other immediately available supply on the battle-field. As a rule only the first sections of these columns would be available.

It is evident from the above that when it comes to matters of transportation we can safely rely upon our own knowledge and past experience.

Capt. G. S. Wilson in his article on "Small-arms Ammunition Supply" in the *JOURNAL OF THE MILITARY SERVICE INSTITUTION*, September, 1886, makes the following suggestion :

"In our Service I would suggest 20 rounds per man in the company baggage wagon, 70 in battalion wagons, and 70 in divisional train. Assuming that our infantry battalions will be of 4 companies of 100 rifles each, then 2000 rounds would be in the company baggage wagon, and 28,000 rounds--or, just one wagon load with the battalion train."

I am of the opinion that outside of the small amount carried

in the company baggage wagons, considering the nature of our country roads, that it would be best for us to pin our faith upon pack animals and 2-wheeled carts. As a matter of detail to facilitate the distribution of ammunition, these wagons should be painted a distinctive color, and should all be of the same pattern.

A well-equipped pack mule could carry 2000 rounds, but as the use of pack animals more than doubles the consumption of forage and the personnel of transportation, and as handling the ammunition twice a day would entail a great loss of time, wagons or carts should always be used when the roads permit. An auxiliary pack-train should, however, be available for use in case of mud.

The following table from Captain Mayne's valuable work, "Infantry Fire Tactics," gives the distribution of ammunition in the different European armies:

Method by which the ammunition is carried.	Supply of Cartridges.					Remarks.
	Germany.	France.	Austro-Hungary.	Russia.	England.	
By the men.....	100	78	100	84	70	A further supply of 11.5 rounds per man is carried in the German service, and 10 rounds per man in the English service, in the company or battalion baggage wagons, but which may not be available on the battle field.
In battalion wagons.....	38.4	18.1	35	48	30	
Total of first supply for fighting line.....	138.4	96.1	135	132	100	
In divisional or first line of ammunition columns....	29.5	46.4	48	52	40	
General total of supply for field of battle.....	168	142.5	183	184	140	
In army corps or second line of am. columns....	29.5	33	32	13	30	

This table is based on the battalions being at full strength, but we can readily see that if we deduct those absent from sickness, wounds, deaths, etc., and consider that the cartridges of the killed and wounded should be used, and that all the troops present do not generally engage in an action, with ordinary care and precaution, each man ought to have at his disposal from 120 to 150 rounds, and a further supply available at the end of the day.

In the European armies the company or battalion ammunition wagons follow the troops they are to supply to a sheltered position not far in rear of the line. Their position is indicated by means of a special flag placed to one side where it can be readily seen, and at the same time not draw the enemy's fire. At night a colored lantern takes the place of the flag. It is a ruling principle that troops engaged are to be supplied from any available wagon. If necessary, connection is kept up between the battalion and its wagons by means of mounted orderlies. In drawing ammunition no formal receipt is enacted. Before an action begins two or three men and a non-commissioned officer from each company report at the wagon, when they divest themselves of their equipments, and with bags and wallets provided for the purpose and kept with the wagon, they commence at the beginning of the firing to carry cartridges to their companies.

The German soldier carries 500 rounds, weighing 44 pounds. This is considered the limit of weight which one man can carry for any distance over rough ground. The French soldier carries 336 rounds (56 packets), weighing 37 pounds. After distributing the ammunition the carriers return to the wagons for a fresh supply. On the offensive it is very essential that each soldier be fully supplied with cartridges before the attack begins, "a sufficient supply for infantry is a necessity for its very existence." On the defensive, when positions can be selected beforehand, small depots of ammunition are established along the line. In such positions more cartridges can be given to the men, as they can lay it alongside them on the ground. When the necessary cover can be obtained, even wagons are posted along the line. In action the ammunition wagons will be, as a rule, within 900 to 1100 yards of the firing line. In the German service, if it is a necessity, the ammunition wagons of a regiment or brigade may be grouped together. In very urgent cases a wagon may be taken at full gallop up to the firing line. The battalion wagons replenish their supplies from the first échelon of the army corps ammunition column. The battalion adjutant is charged with seeing that the details of supply are properly performed. An empty wagon is sent at once to the nearest échelon of the ammunition column to exchange its empty boxes for full ones. This seems a very unnecessary waste of time. Why not order up at once a full wagon? However, the commander of the first échelon can at his discretion, but must if he receives an order,

send some of his wagons to the points where incessant fire indicates that ammunition is being rapidly consumed.

Empty wagons of the first échelon are sent in groups of four or five to the second échelon, where they remain temporarily, an equal number of full wagons of the second échelon taking their place.

In the French Army the battalion wagons are placed in charge of a chief artificer, who is mounted, and who has general superintendence of all the regimental wagons. The troops are supplied from the wagons only when the cartridges taken from the dead and wounded are used up. On the battle-field the battalion wagons are grouped regimentally, and as a rule do not accompany their respective battalions. The officer commanding the regiment or battalion designates the position to be occupied by the wagons.

The men receive extra packets of ammunition before joining the firing line, and advantage is taken of every pause and cessation of the enemy's fire to renew the supply. The sending of men from the front to the rear for ammunition is strictly forbidden. Men from the reserve companies are detailed to bring ammunition from the wagons to the firing line. When a battalion wagon is empty, word is sent to the nearest ammunition section, and a full wagon is brought up and its contents transferred to the empty battalion wagon, after which it returns to its original position. Such a transfer is unnecessary. The wagon should remain where it is until the action is ended. The first échelon of the army corps park follows 2000 yards in rear of the troops. The different sections follow as closely as possible the troops to which they are assigned. After an action the different sections are grouped together at some central point to carry out the general supply. The supply is made by transferring ammunition from the full to the empty wagons, an exchange of wagons being rarely allowed. It would be much more practicable to exchange wagons, and the drivers and teams if necessary. The second échelon follows a day's march in rear of the troops. During a fight it closes in on the first échelon, and constitutes a single "distribution centre" at which the empty wagons of the first échelon refill. The empty wagons of the second échelon refill at the nearest army park, the position of which has been previously designated.

In the Austro-Hungarian Army the following points are to

be noted. Before the beginning of an action 20 extra cartridges are issued to each soldier, making his supply 120 rounds. The confidence of the soldier is thus increased, and at the same time he is enabled to maintain an energetic fire from the beginning of the action.

The supports carry forward and distribute the ammunition required by the firing line. An objection to such a method is, that the supports do not always move up to the troops they are expected to supply, for the firing line is frequently reinforced and extended by moving the supports up on the flanks, or by introducing them into gaps in the line. When a soldier is once in the firing line it is exceedingly doubtful whether he would consent to give up any of his cartridges to a comrade. Rigid discipline and training inculcating the idea of mutual co-operation is the only remedy for the latter trouble. It is well to give the supports more cartridges than they can conveniently hold and at the same time use their rifles as a means to the above end. Such a method has certainly the great merit of not taking men from the firing line. The ammunition wagons are under the immediate control of the battalion or regimental commander. In the Russian Army when operating offensively the ammunition wagons join the engaged units if the ground permits. When compelled to remain in rear, they either join the reserve battalion of the regiment, or the companies which form the battalion reserve. If impracticable for the wagons to join the firing line, ammunition is replenished by making successive demands on the troops in the immediate rear, or on the wagons, if not too far distant.

The above method is to be used only when it is impossible to supply the engaged troops directly from the wagons. When a commanding officer needs ammunition he sends two or three men to the officers commanding units directly in his rear. These officers order their men to give up half their ammunition and detail a sufficient number of men to carry the ammunition forward to the troops who need it.

These men on reaching the fractions to be supplied, distribute the cartridges, and remain under the orders of the commanders of the fractions. In this way a too frequent coming and going between different units is prevented. Extra cartridges are distributed to the men who are first to be deployed, and are carried by them in their pockets. Empty wagons are

replenished by directing them on the second group of the regimental train, at whose head we find the eight wagons told off to the companies and the regimental reserve. Some German and Russian authorities recommend the assigning of two or more pack animals to each wagon, or, in any event, the harness should be constructed with a view to be used for pack purposes.

When there are no pack animals, the horses are to be taken from the shafts, and ammunition carried to a more advanced position than the wagons can attain. If a horse is killed, the man who leads it is to remain near by until another horse is brought up, or the cartridges removed. In the official work on "The Armed Strength of Russia" we read that to convey ammunition from the wagon to the firing line, "the cartridges are sent forward in bags secured to hooks on the harness of the outside horses, driven four abreast, which are thus temporarily used as pack animals."

The German authorities have apparently decided to act in a similar manner, for in the *Revue Militaire l'Etranger* we find that the "supply of ammunition to the firing line is no longer to be carried out by means of carriers. This method has been recognized as completely inefficacious, and the two leading draught horses of the battalion ammunition wagon will be employed instead. Each horse will carry two boxes of 1000 rounds each. These horses will only be taken as far as the supports of the firing line, who will carry forward the supply for the men firing."

It is evident that the European military powers employ similar means and ideas in regard to the supply of infantry ammunition.

The soldier's equipment should be divided into two independent parts—one carrying what is necessary for fighting, and from which he should never part; the other carrying the necessities for living, and which may, if necessary, be carried for him. Cartridges should not be carried in the blanket-bag. It is well known that soldiers will throw their blanket-bags away, and it happens that it is often necessary to leave them behind, in which case the soldier would have no defined means of taking care of the ammunition it contains. If the blanket-bag is retained as a receptacle, there still remains the serious difficulty of quickly getting at the ammunition it contains in time of need.

There are numerous devices to carry the needed ammunition, such as pouches, bags, haversacks, extra pockets in blouses and

trousers, etc. There will, however, always be an objection to any increase of articles comprising the soldier's equipment, and it will require constant watching to prevent the soldier throwing away such articles. I do not believe that there has been any better means of increasing the supply of ammunition at the beginning and replenishing it during the progress of a battle than has been devised by Captain Wilson. He recommends the packing of cartridges in a packet made of light cotton cloth, the packet to have loose ends that can be tied together, forming a kind of belt or loop, all ammunition to be put up in these packets instead of in paper cases, as is the present custom. The soldier receives his cartridges ready for instant use, and either swings his loop over his shoulder or ties it around his waist as a belt. When empty the packet is thrown away. Such a method does away with increase of accoutrement and makeshifts, and greatly facilitates the handling of cartridges. Captain Wilson, in writing of his device, says: "The advantages of the packet extend to all phases of cartridge-handling, but perhaps none would appreciate it more than the man who, when hotly engaged, should receive from the ammunition party one or more, which he at once slips over his head, and his cartridges are safe and more easily got at than if in the box or belt. Contrast his condition with the man, similarly situated, who should have two or three of the present paper cases of cartridges put into his hands.

"To supply more ammunition for battle and at the same time put a less quantity on the person of the soldier while on the march than is done in other countries may seem paradoxical. But I believe that to be the true policy. Celerity of movement is so potent a factor of success in war that our study should be how to sustain the minimum number of cartridges on the soldier, not the maximum. * * * I would stick to old traditions and fix the soldier's marching load at forty rounds." I do not see, as far as the cartridge service itself is concerned, that we can do better than to adopt some of the same means of distribution as are in vogue in the European armies. Whatever system of distributing ammunition may be adopted, it is absolutely necessary that it be practised in time of peace as a regular drill, until it becomes a habit as familiar as any other routine duty. The simplest system will require special training, and the great danger of running short of ammunition should be impressed on the men, and they should be carefully taught in every case to retain a small

reserve of ammunition to meet a sudden surprise or counter attack.

In submitting the above paper originality is not claimed, and I have but attempted to present what is in a large measure a compilation from the valuable work of such a well-known authority as Captain Mayne, R. E. The importance of the subject is considered sufficient justification for its frequent presentation and discussion.

A TRIP TO INDIA, CHINA AND JAPAN.

BY CAPTAIN S. M. MILLS, U. S. A.,

FIFTH ARTILLERY.

(Continued from JOURNAL No. 43.)

THE English artillery service is not organized into regiments, as in our Service, though it is called "Royal Regiment of Artillery," but is organized into brigades, and is composed of three brigades of horse artillery, six brigades of field artillery, five brigades of garrison artillery, and one brigade of coast artillery: Each brigade of horse artillery consists of a staff, ten batteries and one depot battery, the latter is attached permanently to headquarters—trains all recruits and supplies all drafts for the batteries of the brigade to which it belongs. The brigades of horse artillery are designated by the letters A, B, and C, the batteries are also designated by letters of the alphabet, the letters of the battery precede those of the brigade—thus E/A R. H. A. would indicate E battery, A brigade Royal Horse Artillery: The brigades of field artillery are designated by numbers, the batteries by letters. Thus, E/3 R. A. would indicate E battery 3d brigade. Each brigade consists of a staff, fourteen batteries and one depot battery.

The brigades are commanded by colonels or lieutenant colonels, and the batteries by majors. The garrison artillery brigades are designated by numbers, as are also the batteries, but the brigades have in addition a territorial designation, thus 5/I, Scottish or London, etc., divisions.

These batteries of artillery are scattered all over the world, and wherever serving, in the colonies or in India, are under the command of the senior artillery officer in the district where they may be doing duty. This senior artillery officer is attached to the staff of the general commanding the district and in all matters purely of a technical character he communicates direct with the Assistant Adjutant-General Royal Artillery on the staff of the General Commanding in India; in matters of discipline, or ordi-

nary routine matters of general import or of defense, he communicates with the general commanding the district.

The headquarters of the brigades with the depot batteries are permanently located at stations within the kingdom. The garrison batteries are distributed to the fortifications at home and abroad, and some of these batteries in India are equipped as elephant or 40 pdr. batteries. We had one such in the Southern Army during the manœuvres.

I cannot, however, pursue this subject further in this direction without encroaching on my official report, but I can remark, though, that the utmost enthusiasm prevails throughout the artillery for the mounted service, and particularly for the horse artillery. I did not meet or know an officer of the rank proper, who was not wholly intent upon promotion or assignment to a horse battery, and saw none but who would regard it as a misfortune to have to go to a garrison or sea-coast battery. It is quite possible in an artillery organization such as the English have to keep the two different classes of officers separate for these two distinctly different class of duties, which require for their successful prosecution talents and qualifications entirely different. In our Service, with a regimental organization, though the same different class of duties exist, it is not practicable to keep the details distinct. I think it would be much better to meet the demands of modern service to organize and officer some of the regiments entirely as garrison or sea-coast regiments, and others as field artillery regiments.

I venture the statement that there is no artillery service in the world where the officers are detailed by *roster* for the higher course of studies as pursued at our Artillery School. In other services this higher course of artillery is elective, and only taken by those who possess the necessary mathematical and other qualifications and taste for that branch of the Service; with us all must take the higher course as well as the field artillery course, though in many instances much time is wasted, the officers not possessing the qualification.

In matters of drill there is very little difference between the English and our own tactics. In the English drill they require No. 1, who is a sergeant (with us the chief of section), to perform all the duties that we require of the gunner (a corporal), leaving him no time to supervise the other cannoneers, and yet he is responsible for the whole. I think ours is much better in that respect.

The movements of "changing front," which were purposely omitted in our tactics of 1874, for the reason that they found no application in war, were constantly being used during the manœuvres, even changing front forward on an interior gun by throwing forward one flank and retiring the other. The caissons were, however, some distance to the rear under cover during these "changes of front," so that the movement was not as complicated as it used to be with us when the caissons were present.

I noticed a pleasing feature I think worthy of adoption—A battery passing in review; at the command "guide right," given by the commander of the battery as he approaches the reviewing officer, the *drivers* and *cannoneers*—the latter mounted upon the ammunition boxes with arms folded same as with us—*turn their heads to the right*, the drivers at same time extend their right arms with whip pointing over the neck or collar of the off horse, after passing a few yards, resume their former positions.

The following is an outline of the artillery administration in India :

INSPECTOR-GENERAL OF ARTILLERY IN INDIA.

- 1 Major-General (local rank) Inspector-General.
- 1 Colonel Deputy, Adjutant-General Royal Artillery.
- 1 Major Deputy, Assistant Adjutant-General Royal Artillery.

The Inspector-General makes periodical inspections of the artillery throughout India, including all forts, under such instructions as he may from time to time receive from the Commander-in-Chief in India.

There is attached to each division and brigade staff throughout India, as before mentioned, a field officer of artillery who commands the artillery in that division or district. He makes two inspections each year, including arsenals, magazines, ordnance depots, and all ordnance mounted in forts situated within his jurisdiction; he has no authority over officers detailed in the ordnance department, and his duty is confined to reporting any deficiencies for the information of the Commander-in-Chief.

ORDNANCE DEPARTMENT.

All officers of this department are detailed from the artillery for a period of five years; details can be renewed.

DIRECTOR-GENERAL OF ORDNANCE.

- 1 Major-General—Director-General.
- 1 Field officer—Deputy Director-General.
- 1 Captain—Assistant to Director-General.

INSPECTOR-GENERAL OF ORDNANCE.

- 2 Major-Generals.
- 1 Field officer.
- 1 Field officer—Deputy Inspector-General of Ordnance.
- 1 Field officer—Assistant to Inspector-General of Ordnance.

Then follows four different classes of commissaries of ordnance, comprising fifteen officers with the rank of captain or lieutenant :

ORDNANCE MANUFACTURING ESTABLISHMENTS.

- Superintendents of Factories—10 Field officers and captains.
- Assistant Superintendents of Factories—6 Field officers and subalterns.

It will be observed that in India for an army of 200,000 men, about 39 officers are employed in duties pertaining to the ordnance department, which department performs about the same duties as our own, whereas in our Army of twenty-five thousand men, about 52 officers are employed upon ordnance duties.

It was for a time quite the fashion in my own branch of the Service, and sometimes by the Press, to find fault for the various shortcomings or supposed shortcomings of the ordnance department, without considering the difficulties under which that department often labors, being restricted frequently by the very language of the appropriation to a course quite opposite to the best judgment of the corps. I believe that many officers of that corps are as able and as usefully employed as officers similarly engaged in any service of the world, and I believe also that there is a necessity in our Service, as it exists in other services, for a certain number of officers to be employed specially in the technical work of gun construction and upon other questions pertaining to the science of artillery; they should be men of the very highest scientific attainments, a few of them only being permanent and of the higher grade; the rest should be officers detailed with increased rank, if necessary, from any branch of the Service where genius or aptitude could be found; details to be renewed or continued where officers were engaged in special investigations or were experts. The number of officers thus employed to be regulated by the character and necessity of the work being performed at the time. I think the permanent part of our ordnance corps is too large.

The Staff.—There is no such thing as a permanent staff in the English Army or in India, nor is there in any modern army

of the world, *except in the higher grades*, save our own, if we call ours a modern army. The French being the last to give it up.

In India all staff duties are performed by officers detailed from regiments or corps and for a period of five years; the details can be renewed when the officers' attainments are conspicuous. These details are nearly equally divided between the officers serving with British and native troops. When detailed from regiments, the officer after a specified period, usually a year, is seconded in his regiment; that means that an officer is assigned to his vacancy in the regiment, but he is still borne on the rolls, and on rejoining after his detail has expired takes his former position, unless in the meantime he has been promoted. If there be no vacancy he takes the first that occurs, and until then is carried on the supernumerary list.

STAFF DEPARTMENTS.

Army Staff. (Detail for 5 years.)	{ Adjutant-General—Quartermaster-General. Brigade Major (Adjt.-Genl. of Brigade). Staff at stations and staff for Army Corps, Divisions and Brigades.
Personal Staff. (Detail for 5 years.)	{ Military Secretary and Aides-de-Camp.
Departmental Staff Corps. (Permanent assignment.)	{ Commissariat (supply). Pay and Medical Transport. Branch of Commissariat (detail for five years).

The Adjutant-General for India has the local rank of a major-general during the period of his appointment, and his department has to do with all questions or subjects connected with the discipline of the command, arms, ammunition, pay, commissariat, clothing, confidential reports, and generally with the training and efficiency of the army, and upon questions relating to appointments in native regiments. The present adjutant-general, Sir Thomas Baker, K. C. B., A. D. C., is a lieutenant-colonel.

The Quartermaster-General has the local rank of major-general, and holds his office for the same period (five years) as the adjutant-general. The present quartermaster-general is E. F. Chapman, C. B., A. D. C., Major Royal Artillery; his duties and those of the officers detailed in his department are very varied. Under the orders of the Commander-in-Chief he is entrusted with the duty of quartering, encamping, embarking, disembarking and moving troops; knowledge of the roads, and features of all portions of the country applicable for defense; the course of rivers

and power of inundation; in coast districts, possesses accurate information of practical points of landing, and the best position for defense in their immediate vicinity; the construction of rifle ranges, practice and exercising grounds for the different arms of the Service, cricket grounds, and gymnasias, workshops, theatres, soldiers' gardens and recreation rooms; the employment of troops whether by paid or fatigue labor on public works or military defenses; cantonment lands and boundaries, cantonment rules; and funds, forage, bazaars, grants of land and building advances; water supply, sanitary conservancy arrangements; military surveys and reconnoissances, bridges and pontoons; journals of the movements and operations of armies in the field; military science, geography, topography, intelligence, army signalling and telegraphy; also maps, plans and dispositions for defense.

This department, which is similar in name to our own of the same designation, has many duties besides, and commands the best talent in the army. It is divided into various bureaus or branches, presided over by a selected officer. We will take the *Intelligence Bureau*, which is one of the branches of this department in the English Service generally as well as in India, where there are four officers engaged in the special work; one of these, Captain Maitland of the Poona Horse, is with the Russian and English Boundary Commission in Afghanistan. Its organization in India is similar to that in England, but on a smaller scale; it is the only part of the staff in the English Army that has apparently a fixed organization. There is a lieutenant-colonel of Royal Engineers at the head of this branch in India. The officers engaged in this work do not talk much of what they are doing, the character of which work is confidential. I assume we all know the scope and methods employed by this branch of the Service in modern armies, so I will not occupy time in describing it.

The Naval Intelligence Bureau of our own Service reflects immense credit upon those that organized it and have since brought it to its present state of usefulness.

There is hardly a department of the Government that has not had occasion to acknowledge its benefits; and why we are so long in organizing a similar branch in the Adjutant-General's Department is hard to understand. I don't suppose there is an available assistant adjutant-general that would care to take up

the work, but surely there are plenty of officers that could soon qualify themselves for work in that branch of the Service.

Another of the subdivisions of this Quartermaster-General's Department is *Army Signalling*; there is probably no army of the world that gives more attention or more fully appreciates the many advantages of this instruction than the British Army in India.

This is the home of the heliograph and heliostat. As we are frequently threatened with a "permanent Staff Corps" whose duty would be to supply our little Army with this instruction, let us see how this Indian army of 200,000 men manage it. There are four places where officers are instructed in signalling, three in India, viz.: Bangalore, Poona and Meerut and at Chatham in England. The instructors at these central schools are officers detailed for the usual period, and frequently engineer officers, as any officer from that branch of the service generally has charge of army signalling in the quartermaster general's department. Classes consisting of six officers and from twelve to eighteen non-commissioned officers and men are from time to time formed at these central schools of instruction for a *six weeks' course*. The officers and men are selected from different organizations upon the recommendation of the commandants. After passing the qualifying examination they receive certificates as instructors for their regiments. The names of those qualifying are published in general orders. These officers and men return to their regiments as instructors; classes are formed and a certain number in each company receive instruction. One officer from each troop or company and twelve non-commissioned officers or privates from each regiment of cavalry, and sixteen non-commissioned officers or privates from each battalion (eight companies) are specially selected as the regimental or battalion signallers; and three supernumeraries per troop or company are trained to replace men becoming ineffective. The regimental signallers are inspected annually by the assistant quartermaster general of the command, and report sent to army headquarters.

The officer instructor of each command is appointed annually by the commanding officer. When the command takes the field the signal parties are organized from the regimental signallers, under an officer attached to the headquarters staff. The men are armed with the sword-bayonet and a short carbine slung

over their backs. Three men form a complete party provided with their outfit.

Selected men are instructed in telegraphy at the station telegraph office, and when a sufficient number have qualified, telegraph stations are established in public military staff offices for further practice; a soldier signaller receiving a fee of 12 cents for each message sent and received correctly up to a maximum of \$12.00 per month. Soldiers who excel and pass the examination may enter the telegraph department permanently and be transferred to the unattached list.

This is an outline of the method of instruction in signalling pursued by an army prepared to take the field at any time, and does not require a "permanent staff corps."

Let us note a few more facts about staff service, etc., in India.

Since the the transfer of the government of India from the East India Company to the Crown, all officers for service with the native troops now come through the British Army proper upon voluntary application after passing a prescribed examination, and recommendations from commanding officers; after one year's service on probation with native troops, during which period they must pass another examination which includes among other subjects the higher standard in Hindustani; they are finally transferred and do not return again to service with British troops. Their promotion then is regulated as follows, their service counting from date of first permanent commission: viz., officers of eleven years' service, four of which since their transfer will become captains; after twenty years' service, six of which since transfer, shall become majors; after twenty-six years' service, eight of which since transfer, will become lieutenant-colonels. Five years' service as substantive lieutenant-colonel will entitle the officer so employed to the brevet rank of colonel. Colonels can rise to the rank of major-general (there is no rank of brigadier), lieutenant-general on the fixed establishment of general officers of the Indian army.

These officers, after transfer, are eligible with officers of British regiments for staff details and other duties (being seconded in their regiments); and for certain duties in India have advantages which the others do not have.

No officer can be detailed or appointed to the adjutant or quartermaster-general's department, or as brigade-major, who

shall not have passed the final examination of the Staff College (Sandhurst), except the officers of Royal Engineers, under certain conditions, and officers of proved ability on the staff in the field.

No officer can be detailed as an aide-de-camp to a general officer in India without first passing the prescribed examination; and as a first condition in all these details the officer must have the favorable recommendations of his battery, troop or company commander and other commanding officers.

These facts, with what I have said before, give us an idea of the staff service as it exists in India and in the English Army.

Now any one who investigates the subject of staff organization and service as found in modern armies will find that we are in our Service totally at variance with all modern ideas on this subject.

To begin with, we have no military staff in the sense that it is known in other armies. Military writers and commentators of recent times, dwelling upon the importance and well-known necessity of a highly trained and educated staff, have in mind a very different organization and system from what we, having inherited, still cling to.

How are we fulfilling that essential requirement which demands that in time of peace the Army should be used as a training school to prepare officers for their special duties, including staff duty, and for higher command?

Instead of educating and giving experience every year to a number of officers of different grades possessing the necessary aptitude in the various duties of the Army staff at the higher and supreme headquarters, and sending them back at the expiration of their details to their duties, commanding troops, service with regiment and other staff work (for I would open these details to engineer and ordnance officers if they possessed the taste and fitness, and further requiring that they should serve a detail with troops). What do we do? Why we confine the experience and knowledge gained in a lifetime of service to a comparatively few officers, and prevent them from ever coming in contact with the Army except as they see it on paper; their positions permanent and assured, with no responsibility, no examinations, no incentive or ambition other than that found with all officers to do the duty required of them; every daily official act of their lives has to do with a soldier which many of them have

had no practical knowledge in commanding, or at least not for many years; and this is the military staff from which we might hope, if organized as it should be, to find as in other services men trained and experienced in all branches of the Service, and fitted for the highest command.

If its organization contemplated or required the selection of men of approved professional attainments and fitness, with periodical service with troops and examination before promotion, this would be something in the direction of modern ideas, but it does not, though perhaps many of those now in those departments possess all these qualities.

I wish to state, however, that in giving out these ideas I have in mind only the organization and system as we find it, and not of the personnel as it exists, the members of which are in all probability as able and as efficient as the system requires, or as it is possible to get under the law, but I wish to state emphatically that a permanent, fixed military or army staff, as it exists with us to-day, is an anachronism in these days, and is opposed to all modern military systems, where a constant interchange of duties with the line in the lower grades is kept up; the officer finally selected and transferred to the fixed establishment in the German Army has passed through all the examination tests, has gained experience in serving with all branches of the Service and in minor staff duty for a number of years, has become a master and teacher of the science; but in order that he may still preserve the *habit of command and knowledge of troops* he must return periodically and before each promotion to the line of the army, and exercise command for a year corresponding to his rank.

Who is prepared to say that every assistant adjutant and inspector-general in our Army—I speak of those in the lower grades and who have been longest away from troops—would not be more competent to fill their positions if required periodically to command troops and posts.

LIGHT ARTILLERY TARGET PRACTICE.

BY LIEUT. H. L. HAWTHORNE, U. S. A.,

SECOND ARTILLERY.

"The service which artillery can render in action depends upon its skill in shooting at movable as well as fixed targets."—DRILL REGULATIONS FOR LIGHT ARTILLERY, U. S. ARMY.

THE first and most important step in the new departure, should be the adoption of a thorough system for conducting target practice ; and second, a complete code of firing regulations.

In this paper, the first heading shall be made to include the training of the soldier to hit the target ; the second, the training of the officers to hit the target under any circumstances, with the least delay after opening fire, and after that, with the greatest effect ; no attempt will be made to do more than outline a system, which, though modest, may be considered an improvement, at least on the crudities of the past.

I. TARGET PRACTICE.

1. ELEMENTARY INSTRUCTION.

- a.* Theoretical instruction in gunnery.
- b.* Principles of graduating sights.
- c.* Principles of pointing guns.
- d.* Causes affecting projectiles.
- e.* Rules for percussion and shrapnel fire.

2. PRELIMINARY INSTRUCTION.

- a.* Laying and pointing.

3. KNOWN DISTANCE FIRING—FIXED TARGET.

- a.* Fire with percussion shell.
- b.* Method of correction after each fire.
- c.* Number of hits and value of fire.
- d.* Fire with shrapnel—time fuse.
- e.* Effect on target—how judged.

4. KNOWN DISTANCE FIRING—MOVING TARGET.

It might be objected that the theoretical instruction does not properly come under the subject of target practice, but to make

this instruction certain, it would be wise to include it in the prescribed course of practice. This instruction may be conducted practically by means of a rifle barrel mounted on the gun carriage, with canvas screens placed at distances proportionate to the size of the powder charge.

Non-commissioned officers should be thoroughly grounded in these principles, at the same time the relative merits of the cannoneers would be shown. About one month should be given to this work.

In the known distance firing, we should make up our minds to abandon the old method of gathering information from observers and making corrections blindly at the gun, from facts telegraphed to the firing station.

This procedure discourages the use of the eyes and judgment and leaves the gunner helplessly waiting on reports to come from the target. The development of keenness of vision and closeness of estimation of distances and carefulness of judgment should begin in this practice. The gunner thus enters the practice at unknown ranges with a good groundwork for obtaining, in the least time, the greatest advantage from his trial shots. He learns to judge the relation between the limits of the area of dispersion of the shots and the divisions on his sight, for he can give his undivided attention to this, untroubled by the range which is known at the start. His eye is further trained to the adoption of a unit of height for the explosion of shrapnel, which he learns soon for different ranges by the effect on the targets.

The number of hits on the target, alone, should be relied on as a measure of the accuracy of fire and in the use of shrapnel, the rules which insure the most severe effect of the cone of dispersion can be practically demonstrated.

Thus the soldier, from day to day, becomes more familiar with the unit of measure which he may adopt, and will know soon, intuitively, if he be firing effectively, or if not, what corrections are necessary.

The targets used for shell-fire should be of wood, about 12 yards long and 6 feet high, to represent an infantry subdivision of attack; the same for cavalry, but 9 feet high. The artillery target should be made in small sections, each to represent the front of a gun and cannoneers and separated from each other by the prescribed interval. The depth of the targets should be

marked off by stakes and the ground smoothed, in order that the impingement of the shots may be seen. The infantry *silhouettes* should be used for skirmisher targets, while earth-works should be thrown up for the purpose of studying the effects of projectiles against various materials and thicknesses of parapets and revetments.

For shrapnel-fire, the wooden targets should be arranged in column, about 20 yards apart. This distance could be varied in order to discover the most effective shrapnel-fire against batteries in action.

In this practice, moving targets should be used for the purpose of educating the gunner's eye in the proper estimate of the speed of the different arms at various distances. The target should be made to start from a point whose range is known, at a pre-arranged moment and over a measured course. Before opening fire, the target should pass over the field many times, at the average rates taken by the different arms, to enable the gunner to fix in his mind a unit for future estimates.

He should also learn the approximate time occupied by the projectile in passing over the various known ranges and be expected to so lay the gun that, at a given signal, the target should be seen in such a position that, had the gun been fired, the projectile would have hit the target.

There should be no hurry or scramble about this practice, as nothing could destroy more surely the interest of officers and men, and what is worse, leave the gunners totally unfit to enter on the next and more advanced stage.

It is not expected that much instruction could be had beyond this with the small supply of ammunition appropriated for the light batteries, but the hope may be entertained that each gun will be supplied with 200 rounds per annum.

Known-range firing should continue for at least two months, preferably selecting days with varying conditions of wind and sunshine.

This firing should be devoted solely to the training of the gunners and of those who would naturally take their places should any or all of them be disabled. They would thus be prepared to carry out skillfully the manipulation of the guns as fighting machines, under the control of the officers directing the fire.

II. FIRING REGULATIONS.

I. UNKNOWN-DISTANCE FIRE.—FIXED TARGET.

- a.* Use of range-finder.
- b.* Fire with percussion shell : $\left\{ \begin{array}{l} \text{1st. Establishment of the area of dispersion.} \\ \text{2d. Rules for corrections : elevation and deviation.} \end{array} \right.$

2. UNKNOWN-DISTANCE FIRE.—MOVING TARGET.

- a.* With percussion. Object moving towards, from, or in a diagonal direction to the front of the battery.
- b.* With shrapnel.

3. EXCEPTIONAL CIRCUMSTANCES.

- a.* Smoke.
- b.* Masked enemy.
- c.* Short ranges.
- d.* Long ranges.

If what is said of the range-finder be true—that a range can be determined by it in thirty seconds—it will prove a valuable addition to the outfit of a light battery. It will make, undoubtedly, a large saving in ammunition, used in establishing the area of dispersion, besides allowing a sudden and effective change of target during the firing. The area of dispersion could be made very near its minimum at the start, and its usefulness would be particularly important for fire on moving targets.

The range-finder detail should be permanent in the battery, and should be under the direct control of the captain of the battery.

In the firing rules of foreign services, a certain area of ground about the target is taken as a measure of the accuracy of fire. By some, this is called the “fork,” and by others, the “zone of fire.” As the term “fork” is somewhat meaningless, and the word “zone” is used to indicate the divisions of the field of fire with reference to the effect of various projectiles, the expression “area of dispersion” has been taken in this paper as an equivalent, but less ambiguous term.

The area of dispersion is usually established in the following manner: “The distance is estimated and fire commences against a certain point of the object. If the first shot falls short, the next one will be fired with more elevation (depending on the distance). This is to be continued until the object is enclosed by one shot striking in front and one in rear of it. If the first shot falls in rear of the object, the elevation is reduced to such extent that the next shot will strike with certainty in front of the

object. The fork established in this way will be reduced by dimidiation, up to 50 metres."

"The amount of deviation is estimated from the centre of the object. Correction will be made immediately, if the first shot exceed $\frac{2}{16}^{\circ}$ (one mark = $\frac{1}{1000}$ of the range). If the deviation be small, correction is made on a basis of several shots and the average deviation taken. Corrections below $\frac{1}{16}^{\circ}$ are not necessary."

GERMAN FIRING REGULATIONS, 1889.

An area of dispersion is established, whose limits should be four times the probable error in range and twice the probable error in deviation. For mid ranges up to about 2500 yards, these errors of the 3."2 rifle are about 15 and 1.25 yards, respectively. For ranges beyond this, these errors average about 35 and 3 yards. If, therefore, a certain proportion of shots fall within an area of dispersion, 60 by 2.5 yards for mid ranges and 140 by 6 yards for long ranges, the firing may be considered satisfactory. It then remains to determine what proportion of shots should fall short of or over the target, in the determination of the correct range and what error in deviation would justify a side correction; and further, what influence the depth of the target would have on this proportion.

The rules for determining this are various in the different foreign armies, therefore such rules should be subjected to careful trial before selection and adoption. To illustrate:

In France, $\frac{1}{2}$ to $\frac{5}{6}$ of the shots should fall short on a narrow target; $\frac{2}{3}$ to $\frac{3}{4}$ of the shots should fall short on a deep target.

In Germany, $\frac{1}{3}$ to $\frac{2}{3}$ of the shots should fall short generally; that is, if $\frac{2}{3}$ strike in front of the object, the range is too short; if less than $\frac{1}{3}$ strike short, the range is considered too long. If the error in deviation be greater than double the probable error, side correction should be made, but not greater than $\frac{1}{2}$ of a division for mid, and 1 division for long ranges on the deviation scale. If the wind be very unfavorable, correction should be ordered at once for all the guns.

After the area of dispersion is established, all the sights should be placed at the shortest limit. Correction should not be made until after six shots, which have been well observed, have been fired; but should the three first shots fired with equal elevation

show the same variation, a correction should be made at once. But if by increasing the elevation by the limits of the area of dispersion in range, the three first shots fall short, or if decreased too far, it is necessary to establish a new area of dispersion. Pieces which continuously fire short or too far, should be rectified by their chiefs of platoons under the rules laid down for finding the area of dispersion.

Should the shells not be provided with combination fuses, then shrapnel fire, as a rule, begins after the establishment of the area of dispersion with percussion shell. For the successful use of shrapnel, it is essential that the time fuses be of reliable quality, or if this be not certain, then the variability should be approximately known from trial.

The proper point for bursting is placed by artillerists at various distances in front and above the target, therefore it would be well to establish rules for this fire from our own experience with the new guns. Starting with the generally accepted principles that the lower nape of the cone of dispersion is the most effective, and that high bursts cause a great loss in the velocity of the bullets, we may, by experiment on different depths of targets, find the points of most effective bursts for the various ranges. With the elevation of the shortest percussion shots, the fuse should be cut for bursting short of this range by the distance in front where the most effective bursts should occur. If, then, these bursts are seen to be too high or too low, decrease or increase the elevation by half the limits of the area of dispersion, without disturbing the time of the fuse. This rule becomes the more simple by the equal weights of shell and shrapnel with which the 3".2 gun is provided.

To establish the area of dispersion by the use of shrapnel alone, having the time fuse, larger limits are necessary than when using percussion. If the shots strike continuously short without exploding, the range is too short and the fuse too long. By making the necessary corrections, but in changes of, say 100 yards at a time, the points of explosion may be quickly found. In loading for this purpose, the captain should command the loading of the right or left piece only and direct the other pieces to load in succession, keeping the shrapnel in readiness to make any changes he may deem proper. In the use of the shrapnel with combination fuses, this complication is unnecessary.

MOVING TARGET.

In case the line over which the target is advancing be in plain view and have numerous prominently marked points, the range finder could be used to report ranges as before, but this would require very rapid work. It would be well to use percussion shell for this class of fire, unless shrapnel fire has been directed against a stationary target which begins to move, or if the battery be firing shrapnel and is attacked by cavalry.

In case the target be approaching the battery, the general rule should be to establish a large area of dispersion, continue slowly to fire, using the shortest limit, until one shot strikes beyond the target; then reduce the elevation sufficiently to insure the shots striking in front of target and resume the slow fire. The fire should increase in rapidity as the target approaches the battery. When the target is moving away from the battery, the rule for fire should be the inverse of the above.

In the use of shrapnel under these circumstances, the only difference should be to use a rapid fire as soon as effects are noticed.

The fire at targets moving in diagonal directions to the front of the battery should be aimed at the head of the object and the gunner directed to follow its movements with a slow fire.

EXCEPTIONAL CIRCUMSTANCES.

If the target be hidden by smoke so that it is difficult to observe the explosions of the shells, salvoes should be fired to determine the range, then use shrapnel with the proper length of fuse for that range. The rules for fire should also prescribe the necessary correction, when fire is directed at objects above or below the battery.

Against sheltered or masked objects, curved fire should be used, care being taken to correct for the additional drift and the increased influence of the wind. It would be well to have a scale for the reduced charge determined upon. The general rule should be to use the longer range of the area of dispersion and to have a large proportion of the shots pass beyond the target.

In short ranges, the great difficulty to be met is the cutting of the fuse, to avoid having the points of explosion beyond the target. In this fire the study of the effects of canister should be carefully made, so as to be able to open in time to avoid the

mêlée. When the range is effective, the fire should be rapid, preferably by platoons.

For long distances, shrapnel should be used, for obvious reasons, taking care not to have the points of explosion too low. Correction in deviation should be made quickly, remembering that a much larger one is necessary than at short ranges, under the same meteorological conditions.

The modern system has been thoroughly established in foreign armies for many years and these suggestions are founded almost entirely on the methods now in use among them.

The aim which firing regulations should have in view is simplicity, with a large certainty of success in their application; and the care of the battery commander should be the thorough comprehension of them by his officers and men. The groundwork of recitations should be carefully laid, to secure a perfect familiarity with the rules, which no situation could disturb or demoralize.

In the Book of Estimates for the Army appears the much-needed purchase of ammunition for the new field-gun. Under this appropriation can be purchased 2000 steel shell or shrapnel, giving on the average about 33 rounds per gun. Compared with the supply allowed foreign field-guns, this may appear rather limited, but if good use be made of these few shots, much advance can be made in our knowledge of target practice and much interest roused among our officers and men. However, this seems sadly out of proportion to the \$39,000 allowed for *experiments* with one 12-inch cast-steel gun and to the \$28,000 appropriated for similar work on one 10-inch gun.

THE RECENT JAPANESE MANŒUVRES.

BY BVT. BRIG.-GEN. HENRY L. ABBOT, U. S. A.,

CORPS OF ENGINEERS.

IT is now fifteen years since a commission consisting of Generals Upton and Forsyth and Major Sanger, visited Japan on a military tour of inspection. The Revolution of 1868 had placed the Mikado in full control of the government. In 1872, upon his application, the Emperor of France had sent a commission of French officers, consisting of 1 lieut.-col. commandant, 2 captains of engineers, 2 captains and 1 lieut. of artillery, 2 captains and 1 lieut. of infantry, and 17 non-commissioned officers of all arms, to organize and instruct the new army, and establish military institutions upon a modern European basis. In 1875, the date of General Upton's visit, a military academy modelled after our West Point school, having annual classes of about 150 students, with a three-year course for engineers, artillery and cavalry, and a two-year course for infantry graduates; a school for non-commissioned officers; a school for musketry and gymnastics; a veterinary school; and a school for practical engineering had been established. Also an arsenal at Yedo, a foundry at Oji, a depot for remounts near Yedo, and a polygon, or artillery school of practice.

The Japanese Army in 1875 consisted of 1 general, 3 major-generals, 12 brigadier-generals, and 16 three-battalion regiments of infantry, 3 battalions of cavalry, 10 two-battery battalions of light artillery, 9 companies of coast artillery, and 17 companies of engineers, the whole aggregating, on a peace footing, 34,768 soldiers; and, on a war footing, 49,378 soldiers. The population of Japan in 1874 was 33,008,430, giving for the peace establishment about 1 soldier to 1000 inhabitants.

General Upton wrote: "The sudden transition of Japan from ancient to modern civilization, which will ever be the marvel of history, is nowhere more conspicuous than in the army. Appreciating the necessity of substituting a native force in the place of the undisciplined hordes, voluntarily furnished by the clans

under the old *régime*, the government applied for assistance to a nation renowned for the success of its arms. In response to its appeal, officers of distinguished reputation, responsible to their Secretary of War, and not adventurers, were designated for the mission. The zeal, the intelligence, the enterprise, and the success of the French officers were no less surprising than the wisdom of the government in supporting them, without jealousy, in all measures of reform."

The fruits of this wise military system were exhibited to the world in March and April, 1890 in a series of military and naval manœuvres ending with a grand review of troops, to which the foreign ministers and military attachés were officially invited for the first time in the history of the country. Japan has thus boldly challenged criticism, and has received well-deserved praise for her young army and navy, modelled upon European systems of discipline and construction. It is to be hoped that the time has come for the abrogation of certain old treaties based upon the mistaken idea that Japan is still a half civilized nation—and with which she has long been dissatisfied.

The recent manœuvres covered four days, and were had near Nagoya, a large city on the eastern coast of Japan, about 235 miles south from Tokio, the capital. They were conducted on a large scale, as if in actual war, the general outline only being pre-arranged. A powerful fleet of hostile war ships was supposed to dominate the sea, and an army of invasion had been disembarked, and had established itself near Nagoya. The whole coast from Hakodate on the north to Nagasaki on the south was assumed to be menaced from the water.

The Japanese Army had completed its mobilization and the fleet was concentrated in certain protected harbors occupied by the commercial marine under cover of harbor defenses.

The first day was devoted to a sham naval battle. The home fleet was composed of six modern war ships built and armed in Europe; and the attacking fleet of nine similar vessels, among which was the *Nariwa*, the prototype of our own *Charleston*. The operations were regarded by a distinguished English naval officer as highly creditable, both to ships and crews.

The land forces aggregated 28,000 troops of all arms, and for three days carried out a well-devised series of military operations. Advantage was taken of the extensive rice plantations which form an important element in the military features of the coast,

being extremely difficult of passage. In personal bearing, in their soldierly appearance, and in their movements the rank and file won great praise from competent authority.

Although the foreign military instructors still remaining in Japan are mostly German, the dress and equipments of the troops are still strongly marked by the earlier French influence. The infantry are armed with a breech-loading rifle of native design, closely resembling the Martini-Henry, and provided with a sword-bayonet worn as a side-arm whether on or off duty. Black powder was used at the manœuvres, but it is claimed that the Government is in possession of a smokeless variety, the secret of which is carefully preserved. The field batteries were all of late patterns of breech-loading and of rapid-firing guns, and were served with admirable rapidity and precision. The cavalry were mounted on diminutive native horses, and appeared to less advantage on this account, but progress is already making in improving the breed by judicious crossing with imported stallions.

Considered as a whole the manœuvres and display of forces, land and naval, were most creditable, and must have been very satisfactory to the Emperor and his Cabinet, who were all upon the ground.

MERITORIOUS DISCHARGED SOLDIERS.

By J. E. BLOOM, ESQ.,

LATE LIEUT. FOURTH ARTILLERY.

WHILE visiting London in 1882 my attention was attracted by the neat, soldierly-looking uniformed class of men stationed at the most prominent hotels, theatres, etc., and whose services could be obtained at a small and regular charge. Upon investigation I ascertained they were members of "The Corps of Commissionaires," at that time numbering over 1000 members, concerning whom the following brief description may prove of interest :

The Corps of Commissionaires of London, England, is composed of honorably discharged soldiers and sailors (Regular and Volunteer), and has for its main object the obtaining of temporary and permanent employment for its members ; it was founded in 1859 by Capt. Edward Walter, to whose efforts the success of the same is doubtless due. Some of the most prominent officers of Great Britain are now upon its board of governors.

The Corps has a perfect military organization ; in addition it has a sick fund, an insurance fund, and a savings association. Besides having a principal headquarters with a barracks and mess hall in London, it has branches in Liverpool and other large cities.

It has a large endowment fund contributed by the public and by the army and navy, both officers and men, numerous regiments and many of the nobility contributing an annual sum towards the expense of administration.

All the members of the Corps contribute a fixed weekly small amount towards the joint administrative cost thereof, and thus a sense of independence and ownership, and the manly pride consequent thereon, is engendered in the men.

The actual work of administration is done by a salaried non-commissioned staff, under the guidance of an unsalaried board of officers and two or three retired salaried officers.

Active members are enrolled in accordance with their partic-

ular trades, such as common laborers, clerks, porters, mechanics, blacksmiths, carpenters, etc., when not employed in such capacities with permanent employment; they also serve as general commissionaires, messengers, policemen, escorts, nurses, couriers, guides, ticket-takers at theatres, also taking charge of furnished or unfurnished houses; and acting as escorts or guides about the city (a service which would afford work for a large corps during the coming Exposition at Chicago alone, irrespective of the large and permanent field existing in New York to-day).

Commissionaires whose bodily health, either from wounds or other causes, unfit them for ordinary labor, are provided with light work. It is thus manifest that the function of this Corps is not to supply mere messengers only; it goes much farther than this; both permanent as well as temporary employment is secured.

A very small percentage of the wages is paid into the administration and sick fund. Board and lodging for unmarried members is obtained at low rates.

The Corps guarantees the responsibility of its members, the privates at \$50, corporals \$75, sergeants \$100. Men who are old or helpless are not admitted.

The Corps has proved itself of great value to employers, who send to the headquarters for such temporary and permanent employés as they may need. Upon request, men are sent "on trial": if satisfactory, a small fee is paid.

In a future article I will endeavor to describe the details of the organization and administration—this being intended merely to suggest the subject for consideration in connection with its proposed adaptation in this country.

In the United States a special effort is being made at present to better the condition of the enlisted man, and thereby to induce a worthy class of young men to enlist in the Regular Army. Would not this effort be materially assisted if a similar Corps of Commissionaires were provided in which honorably discharged soldiers would be received and provided forthwith with a means of gaining a livelihood in civil life? The mere question should at once clinch the argument in favor of the proposition.

In this country this system is well adapted to a corps composed of honorably discharged men from the United States Regular Army, Navy, Marine Corps, and veterans of the late War,

both Union and Confederate, all of whom would be required to hold honorable discharges and recommendations; it might also be opened to the National Guardsman of ten years' service.

After a headquarters organization is established in New York, branches would speedily spring up in other cities under the guidance of resident officers.

It would be accomplishing something very material for the benefit of the private soldier.

It would be judicious to have the Corps incorporated in New York State or by Act of Congress by a few prominent Regular Army and Navy and National Guard and veteran officers and civilians—the latter to represent the employing class.

This would give the body a status and establish a central board of trustees to take charge of any trust funds, etc. Every Regular and National Guard regiment voluntarily contributing a small annual amount (say \$50) towards the administration funds could be entitled to have an officer on the governing board and the privilege of having honorably discharged members admitted to the Corps, if otherwise worthy, in preference to others—for the number would be limited.

A small executive committee of officers could pass upon the qualifications of applicants, and none be admitted who are not able-bodied and whose character, both while in the Service and since leaving same, has been unquestionable.

It should be clearly borne in mind that it is not proposed to make this organization a "charity" but merely a guide to "self-help."

A CONSIDERATION OF A CANADIAN SOLUTION OF THE PROBLEM OF INFANTRY FIRE TACTICS.

By FIRST LIEUTENANT GUY HOWARD, U. S. A.,

TWELFTH INFANTRY, AIDE-DE-CAMP.

IN a lecture delivered on April 26, 1890, at the Canadian Military Institute, Toronto, Major C. B. Mayne, R. E., Professor of Surveying, etc., Royal Military College, Canada, outlines a modern battle, one between two highly organized and trained forces, armed with modern weapons and skilled in their use, dividing it into four periods.

1st. The Period of Reconnaissance, when the advanced troops of the defense are driven in and his position ascertained.

2d. The Period of Preparation or Destruction, which lasts till the preparatory artillery fire has produced a considerable effect and the infantry and machine guns have been pushed forward till they can with their fire begin to effectively assist in the destruction of the enemy. The attacking line may be assumed to have arrived within six hundred yards of the defended position, when the lessening efficiency of the latter's fire indicates the time for

3d. The Period of Decision, which is carried out with the greatest energy and celerity. The fire is maintained, the advance by rushes with short halts to fire is continued, bayonets are fixed, a rapid fire delivered at about one hundred yards, when the advance is sounded and "the charge takes place over the last fifty yards with cheers, bugles sounding, drums beating, colors flying, and all the pomp and dash of war."

4th. The Period of Completion or Retreat. A retreating enemy should only be pursued by fresh troops, but subjected to volley firing if no fresh troops are available.

Thus he describes a battle as a long drawn-out fire combat, and a short, sharp, decisive, close combat. During the fire combat both sides get gradually disorganized and demoralized, but victory remains with the side which, at the decision, is least demoralized. This demoralization being effected by fire alone,

he urges the consideration under the name of *fire tactics* of how best to employ the fire to get the best results with the least expenditure of ammunition.

Presuming that the value of all weapons depends on the men using them, and that men are controlled more by emotions and habits than by a mere knowledge of what they ought to do, and while training and discipline are powerful means of overcoming fear of death and pain, and dislike of fatigues, and making men more amenable to control in the excitement of battle, the problem which he undertakes particularly to consider is: "How to make the best use in battle of the fire of the Snider Rifle with which the Canadian Militia is armed?"

In view of the inferiority of the Snider as a modern weapon he suggests as one consolation to the Canadian officers, that the French were better armed than the Germans in 1870, and the Turks than the Russians in 1878, and yet both French and Turks were defeated chiefly because their opponents made a better use of what they already possessed.

For the fire combat the necessity of knowing the range is given as the *sine qua non*, and he concludes, notwithstanding the many maps, range finders, etc., the only really available means by which ranges can be estimated for infantry at all times is by the eye. He suggests the German custom of the six best men guessing the range, and the captain taking the average as a basis for his orders. Then wind, temperature, barometric pressure, the inclination of the line of sight up or down, relative movements, must be considered by those looking after the men.

Uncontrolled or independent fire, where each man chooses his own target, his own elevation, his own rapidity of fire and his own time for opening and ceasing fire, is condemned.

Controlled fire is considered under two conditions:

a. *Individual firing.*

b. *Collective firing.*

He shows Individual firing in war to be as a rule inaccurate, by reason of uncertainty of range, uncertainty of the effects of previous shots fired, fatigue, panting for lack of breath from running, excitement, danger; many of which causes of inaccuracy increase as the enemy is approached. Therefore men must be taught not to expect too much from their individual fire in the field, and to make the best use of the fire of the troops in an

action, he endorses the idea of Major Meg of the Bavarian Army, "that to reduce the inaccuracy of individual fire as much as possible it must be confined to ranges at which the bullet does not rise more than the height of a man above the line of sight, which limits this with the Snider to three hundred and fifty yards, using the three hundred yard back sight and aiming at an enemy's feet.

Before considering collective fire he subdivides ranges into :

1. *Short*, within 350 yards.
2. *Medium*, within 700 yards.
3. *Long*, to 1700 yards.
4. *Extreme*, all ranges over that, and limits the use of individual fire to the short range.

Collective firing, used for all ranges beyond *short*, concentrated on stated points is based on the principle that if it takes a man thirty shots in the field at six hundred yards to hit an upright enemy, of thirty men, each firing one shot at the same time with a reasonably correct elevation of sight, one is quite sure to hit. The dangerous zone of a collective fire is the beaten zone both in front of and behind the target, due to individual errors of men trying to fire at the same range, *plus* the zone *grazed* by the bullets falling nearest the firer.

This zone can be increased by having some sights set higher or lower, but only at a proportionately greater consumption of ammunition.

Fire at extreme ranges to take advantage of the long ranging power of modern rifles is suggested as a treat when there is ample ammunition, ranges known, the effect can be observed and the target is of suitable dimensions.

In discussing the direction of the fire, Major Mayne concludes with regard to (1) opening and closing fire, *the attack* should get as close to the enemy as possible without suffering undue loss before opening fire, not, even in an open country, commencing fire beyond the *medium ranges*, especially by troops carrying the Snider and the very limited supplies of ammunition which heavy ammunition entails

In the defense, fire may be opened at long ranges, as the defenders should always know the distance to various prominent objects in their front.

In temporary actions and false attacks long range fire is recommended, or in lack of artillery to prepare for infantry at-

tack, in which case a large supply of ammunition should be provided and special troops detailed for this purpose.

As regards (2) the amount of ammunition to be expended and (3) the number of men to be employed in the firing line, we must remember that the moral effect of losses is greater the more quickly they are inflicted. Therefore it is recommended to use as many men as possible, without having undue exposure to losses from the enemy's fire *until* the effective ranges are reached, and then, of course, all the men that can fire effectively.

(4) The fire must be in long and medium ranges directed on stated objects, usually the most advanced portions of the enemy and the target not too frequently changed. The usual mark is the nearest hostile smoke of rifles or artillery. Each portion of a line should be allotted its task.

(5) The range for all must be carefully attended to, it being more important than individual skill.

(6) Observe the force of the bullets on grounds suitable for observation, and remember that to one on the right of the men firing, a too short fire will appear to fall to the left of the mark and a too long to the right.

(7) Under collective fire control can be best maintained by (a) *volley firing*, or (b) *mass firing* of a limited number of rounds; but he concludes that volley firing should be confined to the longer ranges before the organic units are mixed. He advocates the use of a shrill whistle to warn the men to cease firing after the three or four rounds of mass fire that have been ordered. "Distinct pauses must be made now and then in the firing along a wide front, that of a battalion at least," to allow smoke to clear away, objectives to be chosen, and ranges corrected. To do this one commander must command as long portion of the firing line as possible, viz., that of a battalion. This will be about two hundred yards.

(8) Careful aiming and firing are required for all firing, a slower fire for bad targets.

Rapid firing should never be allowed to sacrifice careful aiming.

(9) The moments of advancing and halting must be left to the senior officers in the firing line. As a rough rule in advancing by rushes, after three shots per man at a new range the line should advance.

(10) While men are authorized to lie down at long ranges,

they are bidden to kneel at medium and stand at short ranges, for the reason that if they are allowed to lie down at short ranges it is too hard to make the men get up again to continue the movement forward.

(11) Fixing of bayonets is considered a sign that it is safer to go forward than to retire, and three hundred yards is given as the point to order them fixed.

(12) Replenishing ammunition under an effective fire is so difficult that men must be given all the ammunition they require before being sent into action, leading troops a hundred and fifty to two hundred rounds per man, while those intended for the assault fifty to seventy.

Much of Major Mayne's matter applies to the Springfield rifle and such partially trained but personally brave infantry as we must expect to employ in war, that the substance of his lecture deserves our special consideration. Doubtless most engagements will only progress through the first two of the periods given, when a partial success or defeat will be accepted or the construction of field intrenchments, a discussion of which is not introduced into the lecture, will change the nature of the combat. But upon that portion of a front where the final decision is sought the last two periods must occur, either in the open or in the attack and defense of field trenches.

The importance of knowing the range is not made too prominent. While by much known distance and skirmishing firing, our Regular troops may be trained to such an extent that independent fire so far as elevation and rapidity of fire may be somewhat permitted, no militia or volunteers can have this training nor be given so much latitude. Some practice in controlling fire far more closely than we now do is needed. The inutility of volley firing has too often been shown with even pretty well trained troops, but the mass fire of three or four rounds is not much of an improvement. The drill should be constant in firing with powder cartridges, the men in sections or squads being called by name by the section or squad leader, and the fire along the line stopped at command, indicated best by the whistle. Advancing by alternate subdivisions of various sizes, one rushing while the other fires should be much practised.

The summing up given under eleven heads is generally that of the tactical methods recommended by the best authorities, but as the lecturer in a previous case says, we must consider human na-

ture first, so under the tenth I think we should realize that as even at the shortest ranges men advancing will throw themselves down at halts for cover, we should accept that and drill to establish the habit of getting up again to go on, instead of trying to keep them standing to fire and get breath.

So in the matter of fixing bayonets (eleventh) if necessary at all except in darkness, woods, brush or fog, no troops are likely to attack over ground so smooth that there is not some cover within three hundred yards of an enemy from which the final spring should be made, and the fixing bayonets would then not only indicate that it is safer to go forward than to retire, but be a sure signal that for that portion of the line at least the time for the decision had come.

I think, however, there are few fields where a battle may be fought on this continent where, after a moderately successful fire fight, the assaulting troops may not be brought within a hundred yards of a point to be assailed under at least partial cover without either firing a shot or being much exposed to hostile bullets.

We must seek cohesion and control by each commander having to look after only a few, two to four, units of command of the next size smaller than his own from the corps to the squad. We may neglect elaborate dispositions in rear of the firing line because that line will stay where it is put better with our men than with European troops, but we must not omit to see that it has abundant ammunition when deployed and is superior in fire, by reason of numbers, better weapons, or training to the return fire of the portion of the enemy's position selected as a target. This line pushed forward and partially intrenched within an effective range will be the *point d'appui* for the assaulting force, taken from other troops, advancing usually without firing in successive open order lines from the nearest cover to close in as a swarm upon the selected point of the enemy's position.

Reprints and Translations.

THE EFFECT ON CAVALRY OF RECENT IMPROVEMENTS IN FIRE-ARMS.

BY CAPT. G. O'CONNOR, QUEEN'S BAYS.

(Reprinted from the Journal of the United Service Institution of India.)

IN common with the other arms of the Service, the cavalry are about to enter upon a new epoch, one fraught with enormous consequences either for good or bad.

That the new departure will be to their advantage, is the opinion of many who have devoted time and attention to the subject. On all sides we see a growing conviction that despite modern arms, cavalry will be called upon not only to assist in producing results on the battle-field, both by the action of large masses and of individual regiments and squadrons, but to so influence the preliminary stages, that the ultimate decision will to a large extent depend upon their services.

To find a parallel with the present high state of excellence and preparedness, imposed by all the principal military nations on their mounted troops, we must go back a century and a half.

That famed military commander, Frederick the Great, with the intuition of genius, had early seen the enormous power inherent in good cavalry. With the time when he commenced to introduce those principles and ideas, which have so successfully stood the test of time and experience, and the present day, a certain resemblance can be traced; then, as now, mechanical and other improvements had brought the infantry nearly to theoretical perfection, and at the same time, great attention was being paid to the mobility of large masses of cavalry with a view to united and overpowering action.

At the beginning of the last century, most of the great battles had been decided by the cavalry: Blenheim, Ramillies, Turin, Almanza and others, all were eloquent of the invincibility of this arm; but at Mollwitz a new era commenced. Infantry marching with great exactness of drill and mobility, and armed with muskets provided with the latest improvements of their time, not only stopped the onset of the successful Austrian cavalry, but after repelling five charges decided the battle.

Whether the defeat of the Prussian cavalry by the Austrian, or the success of the Prussian infantry against the same cavalry, drew Frederick's attention to the necessity of improving his mounted troops, it is impossible to say, but after the first Silesian war, he laid down a system of drill and

tactics, the exactitude of the main principles of which are even now incontrovertible; and which at the king's death enabled the Prussian cavalry to boast of the glorious record of fourteen pitched battles out of a total of twenty-two, won by them.

From those days until the introduction of rifled arms, although the systems of armament remained the same, and the change in tactics, introduced by Napoleon, was in favor of the cavalry—after a lapse of one hundred years, we find the cavalry considered the least important unit in armies, and justifying in every respect the correctness of the views of those by whom they were so lightly esteemed.

The want of energy in the advanced guard duties after the Alma; the supineness of the Light Brigade during the engagement of the Heavy Brigade with the Russians; the Russians repeating their extraordinary mistake of receiving a charge at the halt; and the terrible blunder with the Light Brigade disclosed a state of inefficiency equalled but not surpassed by the Austrian and French cavalry in the later wars; from this reproach Prussians should not altogether escape, considering their few successes relatively to the mass of cavalry they brought into the field, and the demoralized state of their opponents.

The poverty of performance by the cavalry in the last great wars, and the terrible loss inflicted on them by the infantry on several occasions, gave rise on the part of various military writers to the opinion, that owing to the increased range and precision of modern fire-arms, a great curtailment of the sphere of cavalry on the actual battle-field had taken place.

With all due respect to this opinion, as far as the infantry are concerned, it is capable, if not of actual disproof, of some qualification.

If the assumed curtailment had been attributed to the rapidity of fire of the new weapons, combined with an unreasoning dread (born on the rifle range) of their effect, engendering timid leading, there would have been good grounds for the opinion.

To-day we are face to face with the results of a quarter of a century of mechanical improvement, all tending in the direction of increased rapidity of fire, until it may be truly said, never before were the infantry, theoretically, so potential in offense or defense. Turning to the artillery, we find them possessing guns of increased range and precision, and animated with a determination to avail themselves to the utmost of their advantages. Still we are given to understand, that, in defiance of these deterrent causes, the sphere of cavalry usefulness has been enlarged not decreased, and that a great day for the cavalry arm is approaching.

To reconcile this apparent contradiction, it is necessary to keep before us, that although the armament of the infantry and artillery has improved, the fundamental conditions of warfare remain the same, the men are still flesh and blood, subject to the same hopes and fears, the same liability to weakness and fatigue, exultation and panic, and that the modification in tactics, the result of recent improved armaments, by giving increased prominence to moral effect, tends distinctly in favor of the cavalry.

Cavalry must never forget that their greatest successes against infantry have been achieved under favorable conditions.

In the belief that the lessons of the past are still valuable as a guide to the future, and to remind cavalry officers that other factors besides armament have to be considered, we will take as illustrations, various representative occasions on which cavalry have been defeated by, or were victorious over, infantry.

Although Europe is much more thickly cultivated now than in the days of cavalry pre-eminence, in the East immense level plains still afford us a fair field. The lesson taught the Afghans outside Fatehabad and Jalalabad, by the cavalry of Sale's brigade, has never had to be repeated.

At Eylau, Augerau's corps was destroyed by the Cossacks, during a snow storm. At Marengo, Kellerman's cavalry were concealed by vineyards from the Austrians, until the moment of that fateful attack which decided a campaign. At Salamanca, Clausel's division of veteran French infantry, standing with the sun in their eyes, and in clouds of dust from the light soil, were simply annihilated by LeMarchant and Anson's cavalry. Murat's successful charge at Dresden was made during heavy rain. At Albuera also, Colborne's British infantry, firm with the consciousness of never having suffered a check, were defeated by the French horsemen in heavy rain. Under cover of the darkness at Vionville, the 6th Prussian Cavalry Division approached close to, charged, and broke some French squares.

From the foregoing it will be seen that weather is an important factor in weighing the probable result of a collision between the mounted and dismounted arms.

The saying, that good unbroken infantry can never be defeated by cavalry, is only half true, and like most generalizations requires qualifying. Good infantry, in all formations, have been broken by cavalry, both in the distant and in the immediate past. At Austerlitz, Vandamme's column whilst engaged with opposing infantry, was destroyed by the Russian cavalry. Near Hanan, in 1813, twenty squadrons of Russian cavalry broke and captured a French division, formed in eight squares, and supported by eighteen guns. An Italian infantry brigade surprised by Austrian cavalry at Custozza, were routed with a loss of four-fifths of their number. At Langalzala also in 1866, the Hanoverian cavalry broke two Prussian squares, the infantry being armed with the needle gun. Bredow's brigade at Vionville charged and rode over French infantry in line. At Amiens also the Germans rode down a battalion of marines.

On the other hand, when cavalry action admittedly decided great battles, we find the same cavalry under similar conditions, and frequently under the same leaders, used against infantry but ineffectually.

In former days, although the infantry shoulder to shoulder formation with deeper ranks, and the heavier calibre of their muskets gave a greater weight of metal on a given space, their shorter range necessitated allowing the cavalry to approach quite close, and the difficulty of loading precluded more than one volley being delivered by each rank; yet we see at Salamanca, D'Urban's cavalry defeated with loss by French infantry in line, and at Venta de Pozo, French cavalry after defeating some German and Peninsula horsemen were repulsed by Halkett's infantry in various formations.

The terrible slaughter outside the British squares at Waterloo, shows very conclusively that the effect of a volley, was quite as deadly with what those who had used it fondly called "the Queen of Weapons," as with the present rifle. In connection with the most recent instances of the repulse of cavalry by infantry, we have a clear proof of the effects of rapidity of fire.

The Prussian infantry at Mars la Tour reserved their fire until the French cavalry were within 250 yards, then by rapid firing having nearly annihilated their first line, were still able to fire at the second and third.

In Bredow's charge, the French infantry, owing to their fire being masked, were unable to deliver it until the cavalry were close on them, when, if precision had the important effect which is claimed for it one volley would have been sufficient.

The repulse of the French charge at Woerth was effected by rapid independent firing from infantry in retirement. At Mouzon, also by the same means, one company extended beat off a French cuirassier regiment.

The cavalry charges at Sedan afford an exceptionally good illustration of the effects of rapid fire. There everything was in favor of the cavalry, whose approach was concealed from the infantry lines until they were within a short distance of their flanks, and yet, although ridden through with the determination of brave men, the charges were fatal to the cavalry.

Whilst admitting that the successful result of cavalry action against infantry is largely dependent on favorable circumstances, we claim that these circumstances are liable to, and will recur.

With the other arms the result of an attack depends mainly upon the due observance of certain elementary rules, any deviation from which is certain to lead to disaster, but against infantry the result can never be foretold; for instance, when Napoleon ordered the Polish lancers to charge up the pass at Somo Sierra, the wisacres, who thought it a mad proceeding, little foresaw that it would cause the Spanish infantry to fly from their intrenchments. Had Bredow's charge against Canrobert's division at Rezonville not taken place, what a different complexion the struggle might have assumed.

That the introduction of repeating rifles and smokeless powder will effect the cavalry revival is certain, but how, and to what extent, is the problem. The clue to this question will be found in summarizing the disadvantages, from the infantry point of view, of the new conditions:

First.—That owing to the increased range and flatter trajectory of the new weapon troops will have to assume formations, offering as small a target as possible, at distances hitherto never thought of, thus rendering them particularly liable to opportune cavalry attacks. Already a warning with regard to this has been uttered. The greatest Russian authority on tactics having cautioned the infantry against attempting to repel cavalry in other formations than those, which, bringing as many rifles as possible to bear, will only expose immediately to the attack the smallest possible number of men.

Second.—To allow the soldier to carry the increased number of rounds required in the magazine, the calibre of the bullet has been lessened. An

idea was prevalent that this small bullet would not possess the necessary stopping powers against cavalry, but from some experiments conducted in England, at which the Inspector-General of Cavalry and several veterinary surgeons were present, the conclusion has been arrived at that the size of the bullet will make no difference in its effect on cavalry. Despite this *ex-cathedra* opinion there is a lurking belief that in the mad excitement of a charge the small bullet will not be able to stop the impetus of an excitable animal like the horse.

Third.—To exercise an adequate control over the natural inclination, with such ready means at hand to get rid of ammunition, increased stringency in fire discipline has to be resorted to. The vast importance attached to fire discipline points this out as the weak spot in the new conditions.

Not only has provision to be made for controlling the men, so that the most important objective for the time being is under fire, but still more difficult, that such an expenditure of ammunition does not take place, as will leave the soldier defenseless at the most critical moment. Coupled with this is the hitherto unsolved problem of the effective supply of ammunition during the ever varying phases of a fight,

The importance of this last condition is evident from one of the avowed objects of magazine fire, that of its efficacy against cavalry. With the exception of the Russians, who have not yet adopted a magazine rifle, the other continental powers consider that the magazine, if brought to bear on cavalry when within 250 to 300 yards, will, supposing the attack pushed home, rain such a shower of lead that the attack must needs fail, provided that the magazines are full at the required moment.

With the use of smokeless powder another factor in favor of the cavalry has been introduced. Not only will a better view of the scene of action be obtained, and more opportunities for effective action afforded, but increased moral effect will be brought to bear. Assuming that cavalry will not usually attack infantry unless the latter are engaged with opposing infantry or are under artillery fire; from the moment the infantry become aware that they are the object of a cavalry attack until the moment when, from their proximity they can open fire on them, the moral effect on the assailed increases in direct proportion to their want of discipline and natural courage.

It is in this, the moral effect of cavalry, that the deductions of the tacticians of the rifle range are so unreliable, very few men are able with equanimity to contemplate the onset of a crowd of galloping horses.

All the recent developments of the fighting strength of nations has tended to make *morale* a factor of increased importance.

In the next great war the infantry soldier will be without the support of comrades close to him, he will be exposed to unseen and unheard fire, besides having longer distances to traverse before seeing the effect of his own fire on the enemy, and no longer will the noise and smoke of his own and comrades' firing give him heart or screen him from view. On the other hand, the cavalryman is less liable to dispiriting moral influences, such as treading on his own dead, and hearing the cries of the wounded; should he come under unseen fire his mobility enables him to avoid the dangerous

zone quickly, movement is the essence of his existence, the natural exhilaration of galloping, the closeness of his formation, and the presence of his officers in front, all tend to make him at the supreme moment confident of success.

In short, the conviction that the days of effective cavalry action against infantry have not past is founded on the belief, that with weapons requiring delicate manipulation, perfect discipline, and tactical formations based on intelligence, and great moral courage, the advantage remains with the cavalry. The infantry soldier has not the time or opportunity to acquire the veteran spirit necessary to enable him to use his great advantages with the best effect, and will thus fall a victim to the more natural weapons and applied strength of the cavalry soldier.

SMOKELESS EXPLOSIVES.

(From the Royal Engineers' Journal of June 2, 1890.)

THE production of smoke by gunpowder is often a source of considerable inconvenience in its employment for naval or military purposes, although the shroud of smoke attendant on musketry or artillery fire is often an important advantage to one, or other, or both, the belligerents. Until within the last few years, however, but little thought appears to have been given to diminishing this production of smoke, except by the sportsman, who was led to look hopefully to gun-cotton, on its first production, in 1846, as a probable source of greater comfort and success in the pursuit of his pastime.

The cause of the production of smoke by gunpowder, and the absence of it in the case of gun-cotton, is due to the difference between the chemical changes which take place, the products of explosion of the latter consisting entirely of gases and water, while those of the former are mainly solids. In ordinary gunpowder the solid products amount to over fifty per cent. by weight, of the total products of combustion.

Until within the last six years the gunpowders applied to war purposes in this and other countries have varied little in chemical composition; but the introduction of rifled artillery, and the increase in its size and power, rendered investigation necessary, with a view to modifying its action when fired, and to obtaining the best results possible from different calibres of guns. It was, for many years, sought to control the violence of explosion by modifying the size, form, density and hardness of the individual masses of the charge, it being thought that, as the usual proportions of saltpetre, charcoal and sulphur very nearly correspond to those required for the development of the greatest chemical energy, such modification was preferable to that of the proportions or chemical character of the ingredients.

The varieties of powder introduced for artillery from time to time have been of two distinct types; the first produced by breaking up pressed cakes

* From a Paper read by Sir F. Abel, C. B., etc., at the Royal Institution of Great Britain.

of powder into grains, or pebbles, of approximately uniform size; the other by pressing equal quantities of the same mixture of ingredients into moulds of uniform size, under conditions as nearly as possible uniform in all respects. Practical experience, however, with pellet, and other powders of this type, showed that uniformity in the ballistic properties of black powder could be more readily secured by thoroughly mixing together batches which varied somewhat in density, hardness, etc., than by attempting to obtain absolute uniformity in the nature of the individual masses of a charge.

When first it was actively sought, in this country, to modify the ballistic properties of powder, the question had already been partially investigated in the United States, where, as also in Russia, prismatic powder had been adopted for heavy guns; and, whilst its manufacture was being perfected in Russia, Germany and this country, practical investigations resulted in the production of the excellent Fossano powder of the Italians, and of our own powders, known as P² and C², at Waltham Abbey.

Researches of Captain Noble and Sir F. Abel showed, some years back, that it might be advisable to alter the proportions of the constituents by increasing that of the charcoal, and reducing that of the sulphur, and they also threw considerable light on the cause of the erosive action on the inner surface of the gun, showing that the explosive which furnished the largest proportion of gaseous products with the smallest amount of heat exerted the least erosive action.

Meanwhile, two eminent German powder manufacturers had occupied themselves with the question of the production of something more suitable for heavy guns than varieties of the ordinary black powder, not only by means of altering the proportions of the ingredients, but also by modifying the character of the charcoal used, and had invented a slower burning brown prismatic powder, composed of a somewhat higher proportion of saltpetre, much less sulphur, and very slightly burnt charcoal. The smoke produced by this powder is, at first, nearly as dense as that of black powder; but it certainly disperses more rapidly. It was, however, desirable to obtain a powder which burnt still more slowly for use with the heaviest ordnance, and the proportions of the ingredients have, accordingly, been modified to suit these conditions; while a powder, intermediate between the black pebble and the brown, has been found best for ordinary heavy guns.

The recent adaptation of machine and quick-firing guns for naval purposes—especially for the use of ships against torpedo boats—has, during the last few years, rendered a more or less smokeless powder desirable for naval use, and many military authorities consider it also desirable for field artillery and small arms ashore.

The properties of ammonium nitrate of which the products of decomposition by heat are, in addition to water vapor, entirely gaseous, rendered it a tempting material to work upon with those in search of a smokeless powder; but its deliquescent character was a great obstacle to its employment. Mr. Heidmann has, however, succeeded in producing an ammonium nitrate powder of remarkable ballistic properties, which furnishes comparatively little smoke, speedily dispersed, and is less hygroscopic than any such

preparation hitherto made ; it also yields a far larger volume of gas and water vapor than black or brown powder, is much slower, and produces greater ballistic results, while the chamber pressure is lower, and the pressures along the chase of the gun are higher, than in the case of the latter.

The ammonium nitrate powder contains more water than even the brown, and if the atmospheric moisture approaches saturation will rapidly absorb water ; and though the charges for quick-firing guns be securely sealed up in metal cases, the cartridges, if kept for long in ships' magazines where the temperature is high, sometimes for considerable periods, the expulsion of water from some portions of the powder masses composing the charge may give rise to a want of uniformity in the action of the powder, and the occasional development of high pressures. It is not, therefore, uniformly well adapted to the requirements which it should fulfill for naval purposes.

Although it was reported about four years ago that marvellous velocities had been obtained in France from small charges of a new smokeless powder used with the Lebel rifle, and the secret of its precise nature was well kept, it is now well known that more than one smokeless explosive has succeeded the original powder, and that what is now used with the Lebel rifle is very similar to preparations patented in this, and still experimented with in other countries.

In smokelessness nothing can surpass gun-cotton ; but even if its combustion could be properly controlled, and it be used in very small quantities, there are so many difficulties in adapting it to naval or military uses that it is not surprising to find such attempts to fail for the first twenty-five years. Soon after its invention in 1846, gun-cotton wool rammed into cases was tried as a charge for small arms, but with disastrous results. Subsequently Von Lenk made the first practical approach to regulating the rapidity of burning of gun-cotton by converting coarse or fine, loosely or lightly twisted rovings of finely carded cotton into the most explosive gun-cotton, and arranging them so as to modify the compactness, extent and distribution, of the enclosed air spaces. Thus, small arm cartridges were composed of compact layers of tightly-plaited gun-cotton thread, cannon cartridges of coarse, loose yarn wound compactly on a core, charges for shells of very loose, hollow plaits, and mining charges of very tightly twisted rope with a hollow core. It was found, however, that owing to some slight unforeseen variation in the material, or in the air spaces, very violent action was sometimes produced, showing that this system was quite unreliable. The Austrian government began, in 1862, to adopt Von Lenk's system, but unsatisfactory results soon caused them to abandon it. Our own attention was in this way drawn to the subject of gun-cotton, and one of the results of Sir F. Abel's researches was a vast improvement in the method of preparing it, viz. : by reducing the partially purified cotton fibre to pulp, then completing its purification, and afterwards converting the finely divided explosive into highly compressed masses of any desired form or size. This system of manufacture has been in extensive use at our government works for over eighteen years, and has been copied from us by France, Germany and other countries. No success had attended the experiments in England with can-

non cartridges made on Von Lenk's plain, even for small field guns, and in those days the military authorities were not alive to the advantages which might result from the use of a smokeless explosive for military small arms, with which, however, far more promising results had then been obtained at Woolwich.

Abel's system of preparing gun-cotton was no sooner elaborated than it was sought to adapt it for the manufacture of smokeless cartridges for sporting purposes, and after a series of experiments with compressed gun-cotton arranged in various ways, very promising results were obtained with a charge of pellet form, especially with the Martini-Henry rifle. A nearly smokeless sporting powder had meanwhile been produced by Colonel Schultze, which, when subsequently modified, considerably resembled the E. C. powder, a granular nitro-cotton powder consisting of trinitrocellulose, incorporated, when in the form of pulp, with nitrates of potassium and barium. Both these powders produced some smoke when fired, and could not compete with black powder in accuracy of shooting when used in arms of precision. In past years both camphor and liquid solvents, such as acetic ether and acetone, for gun-cotton, and mixtures of alcohol and ether for nitro-cotton, have been used to harden the granules and render them non-porous, the two former having been used in the French and German smokeless powders.

Much mystery has shrouded the nature of the first smokeless powder adopted by the French for use with the Lebel rifle. The visible powder was in the form of yellowish-brown tablets from 0.07 to 0.1 inch square, and of the thickness of stout note paper, and appeared to contain, as an important ingredient, picric acid, which is obtained by the action, at a low temperature, of nitric upon carbolic and cretylic acids. When sufficiently heated, or set light to, it burns with a yellow smoky flame, without exploding; but, if detonated, and containing as much as 15 per cent. of water, it explodes with very great violence. It is no longer a secret that picric acid also forms the basis of the mysterious French explosive for shells, etc., the destructive effects of which have been described as marvellous; and it is certain that this picric acid powder was so deficient in stability as to cause its being abandoned in favor of another, and probably simpler, form of smokeless powder.

In Germany the subject of smokeless powder was meanwhile being steadily pursued in secret, and a small arm powder, giving excellent results in ballistic properties and uniformity, seems to have been for a time adopted, but to have proved deficient in stability. Numerous patents have also been secured, especially by German makers, for the conversion of trinitrocellulose, and other forms of nitrated cotton, by the action of solvents, into horn-like materials, which, when in form of a jelly, can be formed into rods, tubes or sheets, and afterwards, when hardened, cut up as required. Several powders of this nature were brought forward as counterparts of the French smokeless powder.

Mr. A. Nobel was the first to apply nitro-glycerine, in conjunction with one of the lower products of nitration of cellulose to the production of a smokeless powder, which bears great resemblance to blasting gelatine. When

nitro-cotton is impregnated and allowed to digest with nitro-glycerine, it becomes gelatinized, and the two substances furnish an almost compound product. Such preparations are important as blasting agents more powerful than dynamite, and their prolonged immersion in water does not separate from them any appreciable proportion of nitro-glycerine. By incorporating with nitro-glycerine a far larger proportion of nitro-cotton than in the case of blasting gelatine, and by the use of camphor to promote the union of the two and apparently to reduce the violence and rapidity of explosion, Mr. Nobel has obtained an almost horn-like material, which can be pressed into pellets, or rolled into sheets, and which compares favorably with the somewhat similar gun-cotton preparations just referred to, both in ballistic properties, stability and uniformity, beside being almost entirely smokeless. The evaporation of some of the camphor retained in this powder renders it liable to be modified in its ballistic properties by being kept for any time; but it is believed that Mr. Nobel has dealt with this defect, and favorable results are reported from Italy of his powder, as tried in small arms, while Mr. Krupp is said to be experimenting with it in guns of several calibres.

The Government Committee on Explosives, in trying to remedy the above defect in Nobel's original powder, were led to the preparation of other varieties of nitro-glycerine powder, which, when made up into sheaves of wires or rods have given excellent ballistic results in the service small bore rifle. The most promising of these which is smokeless, and stable, is now being tested with a view to obtaining a powerful explosive which heats the arm less.

The erosive action of powders of high energy is naturally far greater than that of the black powder, especially as the barrel remains clean, and when, in addition to this, it is remembered that it has to be adapted to suit an arm, cartridge, and projectile originally designed for use with black powder, it will be seen that the devising of an explosive at once practically smokeless, sufficiently stable, and perfectly safe for use under all service conditions, as well as easily made, and not too costly, is but a small part of the difficulty of adapting a smokeless powder successfully to the new military rifle—a problem now apparently approaching solution. Experience with smokeless powder devised for our Service with guns from 1.85 to 6 inches calibre has already been very promising, but shows that, to utilize its advantages fully, it will be necessary to modify the designs of the guns, in reducing the size of the charge-chamber, and strengthening, if not lengthening, the chase. And when it has been adapted for use with all such guns, the question arises as to whether sufficient confidence can be placed in its stability under storage conditions, in ships and on land, in all parts of the world, to warrant its adoption wherever its use may present advantages.

Opinions differ as to the importance of such advantages, which are, however, founded on a sound basis, and some military authorities consider that the use of such powders must effect a great revolution in the conduct of campaigns. Their noiselessness, however, is, of course, a fallacy, for the reports produced by different varieties of them are really sharper and more

ringing when heard close, though they are not of such long duration, nor so audible at a distance. The present German service powder is not actually smokeless, but the thin cloud produced is rapidly dissipated, and independent firing is not rendered visible by the smoke at 300 metres.

The absence of smoke in future warfare can scarcely fail to change many of the existing conditions under which engagements are fought, but there can be little doubt that both belligerents will use smokeless powder, and, therefore, be under the same conditions. For the naval service the advantages of a reliable powder of this kind for machine and quick-firing guns can scarcely be overestimated, and their realization before long may be anticipated with confidence.

LETTERS ON ARTILLERY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Major W. L. HASKIN, U.S.A.

XII.

UPON THE MANNER IN WHICH FIELD ARTILLERY WILL BE EMPLOYED IN
THE FUTURE.

WHEN I brought my last letter to a close I believed that I had fully answered your inquiries as to the manner in which the transformation of our artillery was accomplished between the wars of 1866 and 1870. I believed that I had gone to the very bottom of the subject and could have nothing further to say upon field artillery.

But you continue to question me. You wish among other things to have my opinion upon the manner in which field artillery will be employed in future, now that its sphere of action has been so greatly extended that marked results are obtained at 5500 yards with shell, and very considerable results at 3800 yards with shrapnel, while at distances between 2200 and 2700 yards the effect produced may almost be called destruction if the results obtained on the practice ground may be safely be taken for the base of our speculations.

If you desire to inform yourself as to the results you have but to purchase the Regulations of 1877, all booksellers have them and they give the required tables.

I had almost decided not to go into the study of this question in detail, for in the first place I have been almost a stranger to the arm for as much as twelve years, and am, therefore not qualified to give an exact account of its present state; I am ignorant of its secrets, and on this account I cannot pronounce a judgment which should be accepted as definite. I could only say to you—leave the past to the old, and for what is to be, turn to the young.

Secondly, I could say that I have devoted ten letters to the exposition of

the transformation in the principles relating to the employment of field artillery between the years 1866 and 1870, brought about by the improvement in precision of fire and by the increase in range. These principles, as I have said, were put to the proof in 1870 and 1871 and passed it most successfully.

I could also decline to comply with your request in stating my belief, that even more considerable improvements still would in no wise change the system, but simply cause the artillery to take another step in advance in the direction which it has already adopted and found to be good.

Finally, I could recall to your remembrance that in 1869 I presented to the Military Society at Berlin, a paper in which I developed my ideas in regard to the employment of field artillery as combined with the other arms when all the troops were provided with rifled arms. You were present. My paper was printed and was for sale, and I could only add that my experience in 1870 and 1871 furnished no occasion for modifying my ideas.

But upon reflection I am obliged to acknowledge that the terms I have heretofore employed do not agree wholly with the present organization of the troops of our Army Corps, with their two infantry divisions, their corps artillery and, eventually, their brigade or division of cavalry: while, heretofore, we have spoken of the advanced guard, the main body, and the reserve of the Army Corps. I find also that I have given in many places as the maxima figures which no longer accord with the more extended range of the modern rifles. I would have to re-write my paper almost wholly to make it of any value or interest at the present time.

I have decided, therefore, while following the same train of thought as in my paper of 1869, to examine what modifications will be brought about in the employment of field artillery by the improvement in our arms since the last war.

To my great regret, I find myself obliged to abandon in many cases the method I have followed in all my preceding letters,—the reasoning by induction,—which bases itself upon known facts, and draws from experience the teachings which it contains. I must proceed by logical deduction, a method which, in the absence of experience, has recourse to speculation. But I can accomplish very little in any other way, for we have not yet acquired experience in actual warfare with the new field pieces.

I do not conceal from myself all the dangers to which I am exposed in using the method by deduction. Many a one has been led into speculations thereby which, later, in face of the reality, are crushed by the facts, and dissipated as the fog or the snow. Often the train of reasoning most perfect in its logic will bring us out far from the truth, for “all theory is but vain smoke,” as the devil says in “Faust.”

In the first place, we must establish with precision the spheres of action of the different arms from the results obtained on the practice-ground at the different targets.

Infantry aimed fire begins at 1760 yards, is sensibly felt at 1200 yards, and increases in effect till it can be called decisive at 500 yards; while at 200 or 300 yards, or at shorter ranges, its effect is destructive.

The effect produced by artillery fire begins to make itself felt at 5500

yards. Shrapnel fire becomes effective at 3800 yards or less, while its effect is decisive at from 2200 to 1600 yards or less. The effect produced by artillery at distances of 1200 yards or less is absolutely destructive, supposing the field of fire to be unobstructed. Since the shrapnel with fuse cut at zero produces such a murderous effect, the fire of artillery at short distances, which was thought to have lost in efficiency because of the small effect of canister from rifled guns, has become absolutely destructive.

The effect produced by cavalry is restrained to that which can be produced by the sabre, and in a front attack against infantry or artillery which is intact and is provided with ammunition, the terrain being unobstructed and dominated by the enemy, this effect at the present time is equal to zero. But this same cavalry has remained in possession of a force absolutely destructive as regards these two arms when it succeeds in surprising them, or when they are out of ammunition, or when they have become demoralized from any cause.

But the effect produced by the artillery is modified more than in the past by the skill of the gunners in aiming properly, in estimating the range correctly, in observing the effect of the fire, in giving the proper elevation for the range, in the quickness with which the enemy is perceived—qualities which the artillerist groups together under the one term "*einschieszen*."

As the distance increases, the difficulty of obtaining the proper range increases also, and finally becomes even problematical, because at the extreme range it is impossible to see even with the best glass.

The greater the range of the piece the more exact its fire should become, and the greater, therefore, the importance of aiming correctly, of observing the effect produced, of giving the exact elevation, and the less the importance of firing with rapidity.

But it will be a matter of great importance that the batteries take position rapidly,—more rapidly than the enemy,—and in superior number, in order to gain the time needed for careful firing, for obtaining the exact range, and for crushing the enemy by this superiority.

On the other hand, the enormous distances at which artillery can now open fire and reach the enemy have had the effect of introducing a new element which merits the greatest attention because it favors the assailant and will be of great importance to us, who, since the time of the Great King, assume the offensive from preference. In eight out of ten cases we can be sure that the artillery of the assailant will find in the terrain, at a distance from 3000 to 3500 yards from the defensive position of the enemy, positions which can be occupied without being discovered by the enemy; either by reason of darkness, or of bad weather, or because they are behind natural cover, or simply on account of the distance; positions in which the artillery of the assailant will be discovered by the enemy only when it opens fire. In the greater number of instances the assailant will consequently have time to establish his batteries carefully.

In 1870 our rifled pieces were of less range than at present, still I remember no case in which the fire of the enemy's artillery annoyed us in the lightest degree at the moment of opening fire. Our artillery alone—I

state only that which I have myself seen—has destroyed the batteries of the enemy as they unlimbered and before they could open fire. This was at Sedan, but occurred at a range of but 1200 to 1600 paces, and where we out-numbered the enemy greatly.

To fire too precipitately, to open fire upon fixed targets before obtaining the range accurately, that will have less effect now than ever before because our pieces are so much more accurate. More than ever the necessity will be felt of giving the artillery the needed time in which to fire each shot without hurry (it is not necessary to affect a pedantic slowness), for, as we have said, the too precipitate firing, by men who do not aim carefully, will produce no effect. A great noise is made, but it is a noise which inspires the enemy with courage.

With our artillery material of 1870 it was desired to confine the artillery combat to distances inferior to 2500 paces, because at greater distances this combat was but a useless cannonade. At present, since the terrible shrapnel carries to 3800 yards, we must begin the artillery combat at a distance of 4500 to 5500 yards. That does not prevent us, however, from seeking, whenever the thing is possible, to reach under cover a position at a less distance; for the first principle of action is that we should always endeavor to approach as near as possible to the enemy.

We cannot rely upon a decisive effect by the artillery at distances greater than 3800 yards (the regulations require even that they should be less than 2700 yards). This distance is still so great that mistakes may easily be made in observing the effect of the fire, and the enemy may be so covered that he cannot be seen. Hence we will be constrained in the greater number of cases to approach to a much less distance at the moment when we seek to strike the decisive blow. The artillery effect will at present become absolutely destructive only at a less distance than 1750 yards.

When opposed to infantry, artillery will, provided it has the choice, seek at the beginning to open fire at ranges greater than 1750 yards; but during the combat it should not hesitate to expose itself to infantry fire at a distance of 1200 or 1300 yards. But artillery, when unsupported by other arms, should avoid a nearer approach to infantry which is still intact. Should the infantry be broken and the artillery be acting in concert with the other arms, it should not hesitate to approach still nearer, especially if upon the defensive, for since we have in shrapnel cut at zero a projectile which produces such a destructive effect at short ranges, we can hope with this fire to repulse an enemy, even when he has advanced to the muzzles of the pieces.

The several objects which the artillery strive to attain remain the same as those you learned when cadet.

1. To open the battle.
2. To gain time.
3. To prepare for the decisive moment.
4. To divert from the other arms the fire of the enemy's artillery.
5. To pursue the enemy.
6. To serve as a support to the other arms.

In order that it may fulfill in a satisfactory manner these different

requirements, the chief of artillery must remain in permanent communication with the general to whom he is attached, and should make it his business to know what his intentions are.

I have spoken to you (in my seventh letter) in detail in regard to this matter.

Ordinarily the chief of artillery will either receive his orders directly from the general, or will know the object he designs to accomplish, so that he may be able to act accordingly when without orders. In the single case when the general directs his attack against an enemy who resists with such obstinacy that he finds himself obliged to bring his last reserves into action and to go in person into the midst of the conflict, in this single case the chief of artillery must act according to his own proper judgment. In this case the rules for his conduct are well defined. He must move quickly to the front to reach as quickly as possible the position seized by his general, for only the fire of his cannon will render secure a captured position.

Up to the present time the artillery combat which precedes each critical moment of the struggle has not appeared to be a decisive combat of itself, but simply a prelude to the battle, or at most a phase in the shifting struggle. Undoubtedly this will be changed in future. Shrapnel, and shell with double wall, produce such a murderous effect that it is permissible to consider the combat as decided in favor of that one of the two parties whose batteries shall have triumphed in the artillery duel. These batteries can then direct their fire wholly upon the other arms of the enemy. Hence the artillery duel will bring about the beginning of the final decision as soon as one side shall have obtained a preponderating effect with shrapnel. We should endeavor, therefore, more than in the past, to reach the field of action with great masses of artillery, in order to be so superior to the enemy in the number of our pieces as to crush his artillery at the outset.

Nothing will be more agreeable to us then than to see the enemy's artillery come into line successively. It will be crushed battery by battery, and we will destroy them without loss to ourselves.

The more accurate the fire of artillery and the greater its range the more necessary it will be to bring it into action early and with all its force. It will therefore be employed in mass, and the principle must be established never to go into action battery by battery, but always by complete battalions.

Another argument in favor of this proceeding,—this requirement that we employ the artillery as a principle only in battalions of three or four batteries—is that it will then be easier to direct the fire, to observe the effect, to obtain the range, and to concentrate the fire of many batteries upon the most important point in such a way as to obtain a destructive effect.

But one exception will be made to this rule, and that is in regard to the artillery detached with a brigade of infantry or cavalry, or to an advanced guard or rear guard, having an effective strength so small that but one battery is sent with it.

While artillery should always consider as a first principle that it should avoid useless cannonades at long ranges, yet we shall often be con-

strained, in spite of ourselves, to open the artillery combat at considerable distances. This combat, however, becomes effective now at distances which, in the War of 1870, we were obliged to acknowledge would lead to a useless waste of ammunition. For this reason many engagements will not develop in future as they have hitherto. The table of ranges for our rifled field pieces for 1877 show an extreme range of 7700 yards, and at this distance half the projectiles reach a target but fifteen paces wide. If, then, for example, a battery on the defensive occupies a position on the prolongation of a road fifteen paces wide, it can, at the distance of almost a German mile, cannonade the enemy's columns on this road, and this so effectively as to make it very unwise for them to continue to occupy it. Therefore the assailant will be constrained to commence the artillery combat at very great distances in order to divert the fire of the enemy from the columns in march.

It could also happen that the artillery would be the object at which the enemy opens fire, and that it would be forced to reply, and that the artillery combat will therefore begin before the heads of the two infantry columns have met, while heretofore the dance has begun with the musketry of the infantry which has pushed forward its first lines in some sort as *antennæ*. But the greater the distance at which the combat opens the denser the veil which hides the dispositions of the enemy. It is to raise this veil that we begin the attack with artillery. The enemy's artillery in replying will betray his position and a cannonade will begin during which the assailant can make reconnoissances and take his dispositions. The great increase in the range of the pieces will therefore lead to the engagement of the whole mass of artillery very early in the struggle.

When the assailant shall have determined upon the place and the moment at which he will attack, then only can the chief of artillery, conforming to this determination, advance with the object of opening the final artillery combat at the range at which shrapnel will produce its full effect, for he should seek to bring about the desired result with his artillery at the place where the infantry decisive combat will afterward take place.

From this it results that the preliminary cannonade, beginning at a greater distance, will last longer than heretofore. The decisive action between the two artilleries will certainly not last so long, on account of the enormous execution done by the shrapnel, but it will be well to delay engaging in it to the end that the infantry, that is to say the arm which really constitutes the army, may have the time to advance and deploy so as to follow up immediately the result of the artillery action with the energetic action of the infantry, and so contribute toward securing the success gained by the artillery before the enemy's artillery may have had time to refit so as to take part again in the fight. Then the artillery will follow the infantry closely into the fight. It will support it and finally will render secure the possession of the conquered position. It will then take part in the pursuit.

I will make the general idea clearer by example.

Imagine that a strong line of our pieces of the recent model occupy the heights of Lipa (battle ground of Königgrätz). It will command the main

road as far as the heights of Dub with 50 per centum of hits and will constrain the assailant (in case he wishes to follow this route with his marching columns) to commence his preliminary cannonade from the line of heights to the west of Mzan, Dub, Ober-Cernutek, in order to turn this fire from his infantry.

On the 3d of July, 1866, the artillery of the assailant could and should advance as far as the mount of Roskos to contend with the batteries of the defender, who had advanced as far as the wood of Shalka and the neighborhood of Sadowa; and when these batteries were withdrawn to the principal position at Lipa, the distance which separated this position from the mount of Roskos was too great for the assailant's artillery, and to open fire there would have been a useless expenditure of ammunition.

At the present time an artillery combat engaged in by the grand line of artillery at Gravelotte against the position of Point-du-Jour and the farm of Moscow (2700 yards) would lead very quickly to a decision, thanks to the deadly shrapnel. This artillery duel on the 18th of August, 1870, lasted throughout the whole battle without bringing about the withdrawal of either of the two lines.

In my paper I could,—basing my opinion upon the range of our pieces,—establish the principle that the fire of artillery at a distance greater than 2500 paces was but a useless cannonade. Now, at that distance, the one or the other of the two parties will very soon have to cease firing.

Horse artillery will also be required to modify its methods when it supports cavalry. Heretofore we could admit that horse artillery, even when it began to act at the proper moment, had, while the cavalry division to which it was attached was passing from the column *en route* to the formation for action, at most but a quarter of an hour, or a half hour, in which to prelude to the attack. We drew from this the conclusion that it should fire upon the enemy's cavalry as soon as it perceived it, paying no regard to the enemy's artillery.

Now the more extended range of the artillery will cause the preliminary cannonade to last much longer. On the other hand, the terrible effect of the enemy's shrapnel fire upon our cavalry will impose upon us the absolute necessity of first paralyzing this artillery before we can be allowed to direct our fire upon the enemy's cavalry. This will naturally come about of itself if the cavalry is skilfully handled on both sides, because the inequalities of the ground with the distance which will separate the two parties will give more frequent opportunities for withdrawing the cavalry from the sight of the enemy's artillery. This will not prevent opening with at least a part of the artillery upon the enemy's cavalry as soon as it is found to be within the effective range of the pieces, for the fact must never be lost sight of that the important matter is to defeat the cavalry, and that, if this end be obtained, the enemy's artillery will fall also into our hands.

We should apply this same principle in the case of artillery acting as the auxiliary of infantry, and the artillery must carefully avoid the error of believing that, since the opening of the fight by the artillery has increased in duration and importance, it has no other final aim than the artillery duel. The final aim is and always will be to defeat the enemy's infantry. Then

the artillery and infantry should always contribute to the attainment of this object whenever an occasion offers, no matter where.

What has just been said upon the mode of employment of artillery in future brings us to speak of one of the essential points concerning this arm, that is, of the place it should occupy in the order of march. It is to be expected that troops in the offensive will be engaged in the order in which they arrive. Although artillery, mobile as it now is, can pass marching infantry by taking the trot as soon as it is to come to the front, it is essential that the distance which separates it from the head of the column (the first theatre of its action is there) shall not be so great that a long time must elapse before it can appear in sufficient force; for the infantry masses would then be obliged to remain too long under the fire of the defender before it could divert his fire from them.

The artillery must march *as far to the front as possible*. That was understood in the War of 1870-71. The reasons which rendered this course necessary then have become more numerous, more pressing, with the increase of range.

How far forward, you ask? I will not lay down definite rules, but will ask you to consider what follows.

The general in command will hasten, even more than in the past, to engage all his artillery so that, under cover of the cannonade furnished by the greatest possible number of pieces, he may begin his reconnoissance of the enemy and draw up his plan of operations. Until he shall have done this he will have needed no other troops in advance of the main body than those necessary to reconnoitre the ground or to serve as escort to this line of artillery. It can even be imagined that, up to this time, it will have been disagreeable to him to see more troops, because they will have been exposed uselessly to the enemy's fire, and because he is as yet uncertain as to whether he will not direct them by preference upon some other point.

While he will open the cannonade, for example, near Dub from the line of heights west of Mzan, Dub, Ober-Cernutek, the dispositions taken by the enemy might lead him to direct the main body of his infantry by Cernutek and Hnewcowes against the right flank of the enemy; and it would be much more agreeable to him if, at the moment he makes this decision, the head of the main body of his infantry had but just reached Milowitz, than if it had already begun to deploy near Dub.

It is only upon the line of march that the infantry could at the beginning cover the first position of the artillery. The other wing, if the artillery deploys only on one side of the route, otherwise both wings, can be thinly covered by cavalry. This escort will be sufficient at first, for the enemy's position is still far distant. It will suffice if precautions be taken to avoid ambushes.

The small effect of artillery at these great distances will lead the assailant, as soon as he has at his disposition a sufficient number of pieces, to approach the enemy to the distance required for shrapnel, even if he is not desirous of engaging at once in the decisive artillery combat.

To return to our example, the line of artillery will soon advance, either

in two échelons or with a front of all the pieces, as far as the line from Mzan to the mount of Roskos.

It will often happen, therefore, that it will be far in advance of the leading infantry, and being nearer the enemy will be exposed to very great danger. Hence, it will use prudence in making careful reconnoissance of the ground upon its front and flanks. Even with the short range of the old rifle pieces it happened that great masses of artillery were obliged to go far in advance of the most advanced infantry. Such a movement was the advance of Dresky with the corps artillery at Vionville, when he crossed the bridge of which mention has heretofore been made, while Flavigny was still held by the enemy.

The history of the war by the general staff tells us (page 704) of a similar movement executed by the whole of the corps artillery of the IX. Corps in advancing to the position between Verneville and Amanvillers at the beginning of the battle of St. Privat, a movement during which it was surprised by the enemy's infantry in ambushade and suffered severe loss.

When, in the same battle, the Guard Corps was engaged and the first battalion of batteries advanced in échelon with the corps artillery, we were for some time over 2000 yards in advance of our infantry as it was coming up to enter the fight. On its right the artillery line rested upon the Hessian division, but its left flank, at St. Ail, was for a long time covered only by the regiment of Hussars of the Guard.

Colonel von Dresky writes what follows upon his position of August 18th. "The foolhardiness of which I was guilty at Verneville should serve as a warning in future in regard to the reconnoissance of positions. The position chosen by me was bordered on the right by a forest. Wholly absorbed in the struggle, I did not make sure of the fact that our troops occupied this forest. Later I learned that at the moment when my batteries took position the wood was still occupied by the French. How easy it would have been for them to discover me, and if they had discovered me what then would have become of the corps artillery of the III. Corps? This experience taught me that in selecting a position it is necessary always to reconnoitre covered ground on the right or left, using non-commissioned officers or trumpeters, before taking position; and to leave men there in observation until our infantry has occupied the terrain in question."

Mention should be made also of the position occupied by the artillery of the V. and XI. Corps at Sedan. At the moment when it became engaged it was so far in advance of our infantry lines that the left wing could at first only be covered by cavalry.

The more extended the sphere of action of the artillery becomes the more frequent will be these unsupported movements in advance of the assailant's artillery masses. As soon as the infantry shall have advanced in its turn to engage at shorter ranges the artillery will no longer be in danger and will then begin the decisive artillery duel.

In that one of my "Letters upon Infantry," in which I treated upon the attack in open plain, I have already given you my opinion in detail as to the manner in which artillery should support infantry after the artillery

duel; and if I enlarged upon this point here, would only repeat what I said there.

I believe I have sufficiently developed my manner of looking upon the future employment of artillery in engagements in the open field. If you add what I have heretofore given you as being the results of my experience in war to this, you can yourself formulate a system for the employment of field artillery in combination with other arms. As for me, I love neither systems, nor rules of action established in advance. I prefer what I call the "Tactics of the Moment."

From what I have said in detail upon the artillery, I will advance the following propositions.

1. *The artillery must make it its chief aim to learn to fire well,—with all that that implies.*

2. *In the manoeuvres the artillery must devote all its energy to acquiring the ability to appear in masses at the exact moment when needed; that is to say, the ability to traverse at a fast gait long distances,—very long,—the length even of many German miles; and to do this whether marching in column of pieces or in battery front.*

3. *It should above all things avoid the idea that the first shot must be fired immediately upon unlimbering. It is not proper to lose time unnecessarily, but the essential thing is that the first shot should be carefully aimed, and its effect be carefully observed to the end that the exact range may be obtained.*

4. *If, as I think, the extension of the sphere of action of the artillery will have for consequence that its fire will usually be opened sooner;—if the artillery duel gains in importance and consequently in violence;—if the action of the artillery continues until the last phase of the infantry fight and even so far as to speak the last word in the pursuit;—then in future a greater quantity of ammunition will be expended by the artillery than during the last war, and arrangements must be made to prevent the supply from becoming exhausted, especially in the critical moments.*

However tiresome it may be I feel called upon to speak in detail upon this last subject.

It seems to me absolutely essential that the first échelon of caissons (three caissons and a repair wagon) should be considered as an integral part of the battery and should always follow it immediately. It is only when the captain, after having taken position, wishes to go into action then, that he gives the order for these carriages to post themselves upon a flank or in rear of the battery.

But even the carriages of the second échelon should not be too far from the battery. They should above all not be separated from it too soon, for in that case they may never again be seen throughout the whole battle. When the battalion chief shall assign the batteries to position, then, and not till then, it will be time to give the order for the carriages of the second échelons to assemble under an officer and take post at the designated place.

The regulations fix the interval between each shot for rapid fire at six or at most eight seconds. At this rate all the limbers of the battery may be

emptied in less than half an hour. You will agree, therefore, that it could easily happen that at the critical moment one might be embarrassed, that is to say might fail of ammunition, if the carriages of the first échelon have not been retained from the beginning so near the battery that, firing slowly and steadily, the shells may be taken one by one from the caissons so as not to draw upon the limbers, but to leave them complete for the rapid fire. If you begin by expending about the half of the projectiles contained in the limber chests for the slow fire, the carriages of the first échelon being at some distance from the battery (which in the course of the engagement could very well bring about an interruption of communication between them), and suddenly a crisis is produced which necessitates a rapid fire, the battery would find itself in less than a quarter of an hour out of ammunition and consequently at the mercy of the enemy.

Neither should the other échelon separate itself too soon or too far from the battery, for the renewal of exhausted ammunition might thereby be endangered and the communications might be cut by other bodies of troops. Nowadays we read in many works called "Studies," otherwise of great merit, that their authors for the simple route march, when the enemy is neither heard of or seen, assign the batteries and their second échelons to different places in the column, placing the échelons for instance at the tail of the advanced guard, or even behind the whole division. Others propose even, in the case of assignment of batteries to cantonment, in the immediate vicinity of the enemy, to station the second échelons at a different place. In view of these propositions I cannot avoid fearing that after thirteen years of peace, artificial arrangements are again coming to be considered which, if applied in war time, will have most sorrowful consequences.

Imagine the second échelons marching behind the division and consequently from two miles to four and a half miles from the batteries. Suppose the batteries to receive the order to take position at a trot and that they traverse at that gait the distances just mentioned. In a little while the second échelons may be almost nine miles from their batteries, for they will not find a battalion which will make way for them to pass. The infantry as well as the artillery will be in haste to engage and will not consent to let an "ammunition train" block the road. Probably these batteries will share my experience at Königgrätz, that is, in all the battle they will not see their caissons again.

Another thing yet. We are certain of expending more ammunition in the future than in the past. It is then probable, it is even certain, that in all obstinately contested battles the artillery must, during the course of the battle even, renew its supply of ammunition from the train. When the first shot was fired after noon at St. Privat we already had to go to the ammunition train for shell with which to keep up the fire. If a battle begins early in the morning of a summer day, we can be sure, as I have heretofore demonstrated, that the ammunition contained in the limbers and battery caissons will not suffice for the whole day. Rapid fire will exhaust this supply in two hours. Certainly we cannot imagine a rapid fire of this duration but the ordinary fire (with intervals of 15 to 20 seconds) will exhaust

it in four or five hours. Even when the batteries do not fire without interruption it will be necessary to make such arrangements that if the ammunition should be exhausted in six or eight hours the limbers and caissons can be filled again from the column. But the special duty of the carriages of the second échelon is to bring this ammunition from the trains. These follow the troops at a distance varying from four and a half miles to half a day's march and are consequently at least nine miles from the head of the column. The earliest time in which they could at a trot reach the station assigned them will be three or four hours after the combat begins. But at this moment the second échelons of the batteries must also have reached this point to be refilled, for much time is lost in transferring ammunition, bringing it to the batteries, and again transferring it. This will be impossible if the second échelons march at the end of the column of troops, for even if they do succeed in finding their batteries during the engagement and in establishing communication between them and the ammunition train, this will, even under the most favorable circumstances, require three or four hours. This is why the second échelons, marching as in war, should form an integral part of the batteries up to the time when the batteries themselves know where they are to take position. After that it may be possible to establish the position of the second échelons.

There remains for me to discuss one point which especially concerns the artillery. I have already mentioned it more than once, but I cannot pass it in silence when the occasion offers to return to it, for I hold it as very important.

In my opinion it is not permissible for a battery to withdraw simply because it has exhausted its ammunition. If this case should occur it has only to remain in line without firing. You deem this cruel—tyrannical? I agree with you, but nevertheless it must be so. At Königgrätz Captain Von der Goltz gave the order for his battery to remain under fire, and it remained there, and in 1870 this course was formally prescribed. Besides, it is wonderful to see with what rapidity a battery obtains ammunition when it is constrained to remain under fire without firing. Von der Goltz proceeded in the case cited above "by way of annexation." Sabre in hand he seized caissons which were wandering about in search of their proper batteries. And who was injured by that? The ammunition was at least used against the enemy instead of being carried here and there without being of any use. Moreover, all batteries which have opened fire will voluntarily aid a neighboring battery which is out of ammunition, and it will be for their own benefit to do so. Suppose, for instance, that a battery is out of ammunition and that the battery on its flank has yet two full caissons, that is, enough to fill completely the limber chests of its six pieces. If it give to the first one caisson, that is to say fifteen rounds per gun, it can be certain that at least for the time required to fire fifteen rounds the enemy will be fired upon by a double number of pieces. Before these fifteen rounds have been fired the supply of ammunition may perhaps be renewed. If on the contrary it does not give half its ammunition, the battery at its side can no longer take part in the action, and it will itself be exposed to the danger of being crushed by the enemy because only its six pieces will have continued

to fire. Consequently, not only the spirit of comradeship but also the instinct of personal preservation requires that neighboring batteries should be aided with ammunition when necessary. But why did not this take place with the battery of Von der Goltz at Königgrätz? Because on his right and left were posted batteries of four-pounders, while his pieces were six-pounders. This will not occur again, for we have now but a single calibre for all our field pieces, with the exception of our horse batteries, which is a great blessing.

In regard to the proportion in which artillery should be attributed to troops it seems to me desirable to give a strong artillery force to advanced guards and rear guards in order to be able to bring the artillery into vigorous action without delay. In 1870, when the First Division sent forward a brigade of infantry as advanced guard of the corps, two batteries were usually assigned to it. I believe it would not be going too far to carry the figure to three. This would certainly leave the Second Brigade with no more than a single battery, but in my opinion our divisions are given too little artillery. It would be well to give each division six batteries, which would form a regiment of two battalions of three batteries each. The corps artillery could then consist of three battalions of three batteries each. This formation would afford a practical method of passing from the Peace to the War footing, since the regiments would no longer be dislocated in view of war, but would continue to form one unit always the same.

It is true that this would lead to an augmentation of our artillery amounting to two batteries per corps.

Against an increase of the artillery the objection has heretofore been urged that the effective force of the infantry diminishes much more rapidly during war than the effective force of the artillery does, and that therefore the desired proportion between the arms soon ceases to exist. But it has always been the case that all generals commanding armies, when their infantry is inferior either in number or in moral worth, have had the tendency to give it a very strong artillery as a support, and to remedy in this way this unfortunate state of affairs.

If we consider what has been done by our neighbors it will seem decidedly advantageous to augment the artillery.

If the increase of two batteries per corps should even be insufficient, a matter which I cannot overlook, then it will be necessary to increase the strength of the battalions of the divisional regiments from three batteries each, to four.

Still another argument which has been advanced against the increase of the artillery is that it will be a great inconvenience to increase the "train" of the army.

Ah, well, my dear friend, I refuse to discuss the matter with men who, after Vionville, St. Privat and Sedan, still consider the artillery as "the train," and not as fighting troops.

When an isolated division marches with an advanced guard of but one regiment, it is hardly to be supposed that more than one battery will be attached to it. In this case it is not necessary to assign more artillery to it,

for the main body of the division will be near at hand and can send its artillery quickly to support its advanced guard.

If my advice should be followed and a regiment of six batteries be attached to each division, then a battalion of three batteries will ordinarily be sent with each detached brigade.

To detached regiments, on the other hand, not more than one battery should be attached.

The breaking up of batteries and assignment of single sections is wholly inadmissible. The reasons which I gave in support of this proposition in the conference of 1869 have only become more pressing as the range of our pieces has increased.

I gave you my opinion in regard to the horse artillery attached to the cavalry division in my *Letters upon Cavalry*. I demonstrated that it is not desirable to break up the artillery battalions, but that an entire battalion should be attached to each cavalry division for the whole war. All the possible reasons which can be drawn from tactics, from administration, from the organization of the Army, militate in favor of my proposition. At the time of mobilization no other arm is dislocated. No unit of but the strength of a company or a troop is detached. We should still less do this with an arm which is so difficult to direct, which has such difficult tasks to perform.

The former principle that horse artillery should avoid engaging in an artillery combat is no longer tenable.

In 1870 the horse batteries assigned to the corps artillery took an important part in artillery combats because they were able to go into action sooner than the others (see what von Dresky says upon the battle of Vionville). The horse batteries of the cavalry division took part also as soon as it devolved upon them to open the battle (Vionville, St. Privat, Sedan).

During a battle the cavalry division has no need of horse artillery, for it attacks only after the artillery and infantry have prepared the way. It only needs it when acting independently.

The Guard Corps attached a battalion of horse artillery to its cavalry division only when it was detached to go in the advance, but as soon as the battle opened this battalion returned to the corps artillery.

The more accurately the artillery fires the more important it is to bring into action a greater number of pieces than the enemy has, the more also it would be a mistaken idea to deprive the artillery firing line of the pieces belonging to the cavalry division by leaving them inactive until the time comes for the cavalry to make its attack.

In your reply to my last letter upon cavalry you raise the objection that to assign a whole battalion of artillery to a cavalry division would render it unmanageable, would attach a weight to its feet. In theory your objection is perfectly just but it is no longer so in practice. Three pounds are heavier than two, and therefore three batteries should be heavier than two. Yet this reasoning is not correct, for three batteries can trot just as fast as two. A cavalry division detached to act independently has many other weights to drag along—many other obstacles to its flight, such as ambulance and subsistence columns. Taking the whole weight into account that added

by one battery disappears. It is only necessary to hold the battalion well together to observe the principle that it should only be employed in mass, and then it will be wholly indifferent, as regards the mobility of the cavalry, whether it has one, two, or three batteries attached to it. But as to the vigor with which it will sustain an action, that is not an indifferent matter.

During the War no division had too much artillery with three batteries ; it is the contrary which was true. Did not General von Voigts-Rhetz immediately increase the horse artillery of the fifth cavalry division to four batteries, with which Major von Körber at Vionville surprised the French camps? It is only in time of peace that there is too much of it, when we do not know what to do with it.

We must guard against dispersing the batteries by assigning them to brigades.

Brigades are not organized with a view to independent action and rarely act independently. When as an exception, the case does present itself, then a battery can be attached, but the rule should none the less be established, that the entire battalion should always be employed as if it were a single battery. Even when a cavalry division sends forward a brigade as an advanced guard, I would not ordinarily attach a battery to it. The brigade of light cavalry has usually no other mission than to observe what passes, to disturb the enemy or populations, to appear, and to disappear immediately. When this is its task, artillery may easily be an impediment to it. But if it is to fight, then a battery should be attached to it. The question as to which it is to do, will be decided by the news received of the enemy's movements, the terrain, and the object which it is to attain. If a brigade be sent out without artillery, and the situation changes so that the object to be accomplished by the brigade changes, a battery can be sent to join it. It is thus that we proceed in war. The cavalry division of the guard at first sent out the dragoon brigade without artillery. When it approached the Moselle and it might happen that it would have to take or defend defiles, a battery was sent to it.

As for me, I think the case may easily arise when the whole battalion belonging to the division may be momentarily detached to join the advanced guard. If, for example, a locality or defile is barred by an infantry detachment relatively weak, supported by some few pieces of artillery, and it is important that the enemy should be quickly dislodged, it is preferable to bring rapidly into action an artillery force superior in number, rather than to dismount the light cavalry to engage in a dismounted combat in which it would be exposed to considerable loss.

In the case in which a division is required to cover or to reconnoitre two roads, it would doubtless send forward on each a light brigade or a regiment and follow with one or two brigades in rear of the centre. To these should be attached a battalion of horse artillery, which would be sent to the front as a whole at the moment only when it is required to overcome the resistance offered by the enemy.

The same for three roads. In this case only a single regiment would doubtless be sent forward on each road. The main body, composed of at

least a brigade of heavy cavalry, will follow, and the battalion of horse artillery will march with it.

The same principles should be followed when a brigade of cavalry is detached. The aim assigned it will decide whether or not a horse battery should go with it.

The greater the range and accuracy of the artillery the more easy it will be to indicate the manner in which horse artillery will conduct itself in an action where it supports its own or opposes the enemy's cavalry. As a general rule, it will occupy but one position until the moment when the cavalry combat shall have decided, and this position should be as near the enemy's artillery as the configuration of the ground will permit. From thence it will silence this artillery in a duel of which the duration should be as short as possible. From this same position it will then usually attack the enemy's cavalry.

But it has become very much more difficult to reconnoitre and occupy this position at the opportune moment. For this reason artillery should be commanded by a superior officer who will remain near the division commander until the moment when he should lead his batteries into position. He must not be required to occupy himself with the affairs of detail in his batteries, but simply to keep himself thoroughly informed as to the intentions of the general commanding the division.

When the artillery has once opened fire the general will usually take post on its flank, for from the elevated position it will occupy he can best give his orders. The chief of artillery will then be near him, and will be separated from him only at the moment when the division commander goes in person with his last reserves to take part in the action. Then the critical moment comes for the artillery commander, for he must decide whether he will follow the general to assure the victory, or remain where he is, so that in case of defeat he can arrest and drive back with his fire the pursuing enemy and indicate to his own cavalry a point where it may rally.

The question of a special escort for the artillery remains to be considered.

You know I am an enemy to any permanent special escort.

Generally the artillery should be posted so that the troops formed for combat shall cover it. But, as ordinarily a battalion of horse artillery will be posted upon one of the wings of the division and will open its fire there, it is a necessity that the exterior wing should be covered. If the artillery position be well chosen it will be but little menaced on this exterior wing. It will suffice to protect it that a platoon of cavalry be sent there with orders to send videttes out far enough to render a surprise an impossibility. To take from the cavalry division a special escort strong enough to engage in combat will be to deprive it of too much of its strength, the absence of which will be felt in the final struggle.

THE SMOKELESS POWDER.

BY CAPTAIN J. CASTNER, GERMAN ARMY.

Translated by Captain MAX WESENDORFF, First Cavalry.

IT was in the year 1846 that news spread of a preparation for shooting purposes, neither making the usual report nor producing smoke, which created quite a sensation in interested circles. Boettcher at Frankfurt and Schoenbein at Basel, had independently discovered gun-cotton at the same time. The new invention was seized upon everywhere with high-strung expectations, and even the German Diet at Frankfurt attached it to so great an importance that it charged a special commission with its examination. The new explosive which, since the beginning of more extended experiments in Austria, had been given the name of gun-cotton,—did away with two faults of common gunpowder—the annoying smoke, and the not less annoying residuum in the barrel of the weapon. Yet a gun-cotton, as the name promised, that is an explosive which in shooting from fire-arms could replace gunpowder, was not obtained, in spite of arduous experiments continued through years; though the result was nevertheless an excellent material for blasting purposes which is very highly valued by the artillery of to-day for charging hollow shot.

Thirty years ago the time was not yet ripe to invent a new gunpowder in the sense of our present day, nor to apply it. Chemistry had not then made clear the nature of explosives. The instruments for measuring the pressure of gases within fire-arms had not been invented, nor the metres of to-day, by which the velocity of flying projectiles can be determined, nor yet the weapons which necessitated a powder of different effect from the old black powder. While the question of a suitable powder for the heavier guns began to be agitated when the necessity arose to meet iron-clad ships; the need of a new powder for the lighter fire-arms did not arise until it was recognized, that a repeating rifle of small calibre was the fire-arm of the future. But besides technical difficulties in the way of the adoption of small calibre arms, there was also the want of a suitable powder, which, besides being less objectionable, should have more power and take up less room, than the old black powder. Aside from this, some desired and others demanded as further good qualities the greatest possible consumption of smoke, and in connection with this, less residuum in the weapon. It was said quite correctly that in quick fire from single barrelled guns it must be expected that lines of sharp-shooters with repeating rifles and using the old powder, would soon be enveloped in impenetrable clouds of smoke, so that aimed firing could no longer be thought of.

The demands made upon the new powder were, as a close examination showed, seemingly contradictory—great power and small internal pressure with slow combustion. How were these contrasts to be reconciled? The small development of smoke, however, seemed not impossible to the science of chemistry, which meanwhile had developed in extraordinary pace. It

was known that the nitrate-cellulose treated with nitric and sulphuric acid, by adding bodies rich in oxygen produce explosives at whose combustion all carbon burns to carbonic acid or oxide of carbon, a consumption of smoke entirely sufficient for practical purposes.

Now commenced a wonderful rivalry among the chemists, manufacturers of explosives, and fire-arms!. The military commissions for examining into the merits of weapons were overwhelmed with inventions, and when General Boulanger commenced his political career at the head of the French Army, the inventors of explosives had found the most favorable fostering soil. "Melinite,"* a nitro-carbon and collodion, was invented, and heated the heads of the French in a manner agreeable to the minister of war. Quickly he introduced the repeating rifle of eight millimeter calibre, in which he used in great haste a nitro-carbon powder. Soon its uselessness, due to chemical inconsistency, was shown, and compelled, for the time being, a falling back upon the old powder. Then the powder-engineer Vieille succeeded in producing a smokeless powder of excellent qualities, whose principal component is said to be gun-cotton. Gun-cotton then has become after forty years what its name indicates.

This powder, according to French reports, is as equally well suited to small calibre fire-arms as to guns. The French have, indeed, so far succeeded in preserving the secret of the composition and manufacture of this powder, thanks to their effective espionage law. The characteristics credited to this explosive, *i. e.*, great force with small pressure of gas, and little residuum, with freedom from smoke and noise, called forth an immense excitement in all armies, especially with regard to the two latter qualities. These two qualities place us indeed at the beginning of an entirely new mode of warfare. If it be considered that the smoke from the powder enveloping the firing troops, while indeed giving them cover against the enemy's observations, at the same time prevents their aiming and observing the effect of their own fire, then it becomes clear that an unobstructed vision must greatly increase the effect of firing, especially of the artillery, at the great distances which rule in the beginning of the action. This advantage agrees with the rules of tactics for infantry and field artillery, according to which considerations for cover must always be secondary to those for the effects of fire. Indeed, we may expect that the great distances in fire action, forced by the long range arms of to-day, with undiminished sureness of aim, will yet experience a further widening to weaken the effect of the enemy's fire.

But over against these one-sided advantages there are very great disadvantages. It has been found at the more recent manœuvres, to the terror of the leaders of all military bodies, that the firing lines of the enemy can no longer be recognized or found with the naked eye at a distance of but a few hundred yards. From this it follows that a troop may suffer great losses by the enemy's fire without knowing where this fire comes from and in which direction they must send their own fire in return. For the clouds of smoke which hitherto have marked the position of the enemy, are no

* Melinite is generally believed to be a mixture of fused picric acid, in granules, with collodion gun-cotton.—J. C. B., Ed.

longer a guide with the new powder. And if it should turn out, besides, that the report of the shots, too, is much smaller than formerly, then the enemy covered at close distances behind hedges, would not even betray itself by the report of their shots. It is indeed a most uncomfortable way of fighting, and it can be easily understood how in the first manœuvres with the smokeless powder the firing could produce so dismal a mood among the troops engaged, that it awakened the desire in all to retain the old gunpowder. But how will the scene of action appear when the artillery, too, will open their fire with the smokeless powder from a distance of 4000 or 5000 yards? As neither the smoke of their own guns, nor that of firing in their front obstructs their aim or observation of the effects of their fire, they can have annihilated a troop before the latter can be positive from whence they are fired upon. In addition, the artillery will not fail in future to charge their shells with an explosive which produces the densest and blackest smoke possible in order to better observe the effects in the unobstructed position of the enemy by the clouds of smoke standing out against the surrounding background.

But of all military bodies it is the cavalry who will find it hardest to part with the old powder, and who will justly wish itself back in the "good old time." For their most faithful ally, their dearest friend was the powder smoke, which hid their attacks and prevented the attacked infantry from aiming. While the smoke not unfrequently gave them the opportunity for an unseen and surprising attack. They will in future hardly have such chances to cover their compact masses against the distant effects of the enemy's artillery fire, but will find themselves pushed more to the rear of the battle-field, unless the surrounding country should offer natural cover close by.

Should what is asserted by French technical papers prove true besides, that their smokeless powder makes but a very light sharp noise in the discharge, then the uncomfortable aspect of the fight must be yet more increased. It is a well-confirmed experience that the din of the battle, the thunder of the cannons, acts, as it were, to steady the nerves, and it is well known that timid people, not yet used to the fight, are wont to "shoot themselves courage."

Considering all in all, it cannot be doubtful, that we are approaching a new epoch in the mode of warfare, in which intelligence, discipline in general as well as in fire will, in yet higher measure than now, be decisive. How the actual battle will be in reality, we must leave to future experiences. To retain the use of the old gunpowder cannot longer be thought of as matters lie at present. Germany will not dare to do so, since France has taken the lead in introducing a smokeless powder. The prospect of success in a future combat *he* secures to himself, who most quickly learns to recognize and control the new conditions of warfare, resulting from the use of the smokeless powder.

MOUNTAIN ARTILLERY IN EUROPEAN ARMIES.

Translated from the French of Captain BORDENHORST.

By FIRST LIEUTENANT C. D. PARKHURST, FOURTH ARTILLERY.

(Continued from No. 45.)

II.

ENGLISH MOUNTAIN ARTILLERY.

THE order of battle of the English Continental Army upon a peace footing does not comprise mountain artillery properly called. However the formation of the batteries is ordered, in case of war, and it is all prepared during peace. The material, the ammunition, the saddles, etc., are kept in store in depot, in such a manner that the formation of the batteries can be made, in case of need, by the garrison artillery, with all the rapidity and facility desirable.

The order of battle of the Indian army upon a peace footing does comprise, on the contrary, four mountain batteries of 7-pounders for the Bengal army, and two for the Bombay army.

All the English mountain batteries, whether in Europe or in India, are armed with 7-pounder guns of cast steel and muzzle loaders. The guns are jointed and are made after the Armstrong system. They were first used in the campaign in Afghanistan, and behaved well there. * * *

A. The Gun.—The guns of the latest model of the English mountain artillery are of steel and are composed of the chase, the middle part, and the breech. The chase has a conical form and has at its base an annular enlargement, which serves as a support to the middle piece. On the interior of the base is a conical groove, in which fits the front end of the breech.

The breech has on its exterior surface five screw threads at the front end, and a knob at its rear end.

The middle piece consists of an annular cylinder which abuts against the annular enlargement of the chase, and which is threaded upon a part of its interior surface so as to be screwed upon the breech.

To put the gun together the breech is placed vertically, then the chase is put in place and the ring is screwed up, which is done by forcing, by giving blows with a mallet upon one of the trunnions, which is surrounded by a sleeve to protect it. This operation is very easy and only requires from 35 to 40 seconds.

To take the gun apart the operation is performed by inverse means, and only requires 25 seconds.

With respect to its external form, the English jointed gun has the same general characteristics as muzzle loaders. Internally it comprises the rifled bore, the smooth stricture or contracture in front of the chamber, and the smooth chamber. The vent is screwed into the gun perpendicular to the axis, and opens at the middle part of the length of the chamber. This latter has a greater diameter than the bore, and is joined to the diameter of

the constricture by a curved surface forming an annular projective against which the projectile abuts. * * *

The English mountain gun weighs 181.4 kil. The chase (with the sleeve) and the breech have the same weight, *i. e.*, 90.7 kil.

B. The Carriage.—The mountain artillery carriage is of plate steel, and is constructed after the Englehardt system.

The carriage is composed of flasks in plate steel, bound together by a head plate, cross plates and bolts. The flasks have, on their upper part, bands for trunnion beds, and underneath grooved bands for the axle seats.

The axle is of quadrangular prismatic form and can advance or retire in its seat. It is not bound to the carriage in a fixed position. The connection is made by three iron buffers and three steel spiral springs. The buffers are fixed to the axle and pass through the cross-plate which supports the springs. Upon the buffers the springs are placed. * * *

The elevating apparatus is a toothed arc and wheel. * * *

The wheels are of wood with metallic hub. For transportation the carriage is taken apart. The body of the carriage forms the load for one mule, the wheels the load for a second, and the axle with the springs and the elevating apparatus that of a third.

C. Ammunition.—The mountain artillery ammunition consists of shrapnel and case shot.

The firing charges are composed of floss silk sacks containing 680 gr. of course grained powder.

The initial velocity of the projectiles is 438 m. * * *

D. Transportation of guns, etc.—The English mountain guns are transported by the aid of pack animals, of whom 2 are required for the gun, 3 for the carriage, 6 for the ammunition and 7 for the implements, accessories, rations, etc.; one animal carries the chase and the middle part of the gun lengthwise of the animal, the muzzle to the rear, weight, 90.7 kil.; a second, carries the breech, whose threaded part is protected by one annular ring, weight, 90.7 kil.; a third, the body of the gun carriage, weight, 80.3 kil.; a fourth, the axle, the elevating apparatus, and the axle case, weight, 107.5 kil.; a fifth the wheels, weight, 89.3 kil.

E. Organization.—Effective strength of a battery upon a war footing, comprises 7 officers, 195 men, 24 horses and 110 pack animals, guns of 7 cm. 6, saddles 18, pack saddles 103.

The English Army has, in time peace, in India, 6 mountain batteries, 4 for the Bengal army, 2 for that of Bombay.

The Bengal batteries have each in time of peace, 4 guns, and on war footing, 6 guns, and an effective of 5 officers, 173 men.

The batteries of the Bombay army have always, in time of war or in time of peace, each 6 guns and an effective of 6 officers, and 228 men.

Each battery therefore carries with it 600 rounds.

RUSSIAN MOUNTAIN ARTILLERY.

The bronze 3-pounder breech-loaders were introduced in the Russian artillery in 1867, to serve as mountain guns; Russia then was the first to introduce breech-loaders into her mountain artillery.

After the introduction of the field guns in 1887, a new gun was thought of for the mountain artillery. To this end experiments were made simultaneously with a Krupp model of 63 mm. 5 (2½ inches) and a gun of the same calibre proposed by Baranowsky, the constructor of the 3-pounder guns of 1867. The result of these experiments was the adoption of the steel gun of Baranowsky.

Among the carriages, choice was made of the jointed carriage proposed by Krell, which was not definitely adopted until after numerous modifications proposed by the committee on artillery.

Hardly had the extension of the construction of this material begun when the idea of jointed guns sprang up, which attracted the attention of the Russian technician. The armament of the batteries with the Baranowsky guns was stopped for some time, and experiments were begun with jointed guns of the Krupp and Obuchow systems, experiments which have not yet ended (1884) with positively satisfactory results.

At the end of 1882 all the Russian mountain batteries, with the exception of Battery No. 5 of the 3d Artillery Brigade, were armed with 3-pounder bronze guns, m. 1867. The above-mentioned battery had steel guns of the Baranowsky system.

We will give the description of those guns :

A. 3-pounder Russian mountain guns, breech loaders, m. 1867.

A. The Gun.—This gun is made of bronze and has the form externally of a single cone, terminated at the breech by a squared part, intended to receive the breech mechanism. The trunnions, whose axis intersects that of the gun, has square rim bases. Upon the chase and near the muzzle two hooks are found by which the tompon is fastened. Upon the right rim base is found the front sight, and upon the right of the breech the seat for the hausse. A bronze plate protects the loading orifice of the breech mechanism. Finally, upon the left side of the seat of the breech block a small groove opens, intended to receive the stop-pin of the breech block.

The rear part of the chamber has an enlargement of a particular form to receive the steel ring and the copper trimming. The external diameter of this ring being from 0.5 to 0.8 mm. greater than its seat in the chamber, a certain pressure is necessary to fix it there. This ring, whose interior is slightly conical, penetrates from 1.5 to 2 mm. into the seat of the breech block to assure its contact with the Broadwell ring of the supporting plate of the breech block and thus obtain a positive obturation.

The Broadwell ring is lodged in a place hollowed out of the supporting plate, and its plane surface is supported, as in the Italian mountain gun, when the breech is closed against the steel obturating ring which projects beyond the front surface of the seat of the breech block. It is then that the obturation is obtained during the firing. The winch handle is fixed upon the square part of the formature screw by means of a pin.

The other dispositions and the handling of the breech mechanism are similar to those of the Austrian mountain guns of 7 c.m., m. 1875,

B. The Carriage.—The 3-pounder mountain carriages are composed of two parallel mountain flasks in plate iron, reinforced from the trunnion beds up to the head by a fixed plate, and upon all other sides by rivetted

angle irons. The trail is consolidated by a rivetted plate under the corners, and which forms a shoe to prevent the end of the trail from sinking into the ground. The axle seat has reinforcements upon each flask, both externally and internally. The two flasks are bound together by three cross bolts. That at the head of the carriage serves also as a support to the two branches of the elevating fork.

The iron axle has a square cross section. The arms are a little enlarged where they pass through their two seats, to prevent lateral displacement. The axle is kept in its seat by two bridles rivetted to the corners. Between the two flasks are placed, the one above the other, two cross plates, each pierced to give passage to the working pin of the shaft attachment. The upper cross piece is terminated by two hooks intended to receive the braking cords.

The wheels are of wood, with wooden hub, iron tire, six felloes and twelve spokes. Upon the hub is fixed a hook in which the braking cord engages.

The shaft attachment for the 3-pounder guns is composed of three parts that can be taken to pieces for transportation, viz.: the crossbar and the two shafts. The crossbar is terminated at its extremities by two iron sockets in which the shafts engage. At the middle part, and on top of the crossbar is fixed the working pin, by which attachment is made to the carriage. Underneath is fixed an iron fork whose extremities have sockets also, through which the shafts pass.

Screw eyes, fastening clasps, and keys serve for the loading of the different parts upon the pack-saddle and the hitching up of the shafts.

C. Ammunition.—The ammunition of the 3-pounder mountain guns consist of shells, shrapnels, case shot, cartridges, friction primers and signal rockets. * * * The shell adjusted weighs 3.99 kil., of which 153.6 gr. is for the explosive charge, 205 for the fuse, and 1.381 kil. for the lead sleeve.

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D. Implements and Accessories.—The implements and the accessories of the 3-pounder mountain guns are generally the same as those in use in the artillery of other countries.

The ammunition cases are of wood. The cover and sides are reinforced by iron bands. The ends have handles, and on the bottom of the box are two iron rings at the back part, with one in front. The first two serve to fasten the case to the pack-saddle, the one in front is intended to fasten the two cases together, underneath the belly of the pack animal (by a lashing) to prevent, as much as possible, all swaying during the march.

The covers, being hinges, the fastening is by means of a hasp and key. The hinges have, on their upper part, a cover which prevents the entrance of rain.

The interior of these cases is divided into three compartments, and carries 6 shell, or shrapnel, the corresponding charges, a case shot, with charge, the friction primer, and finally, some implements for the gun.

E. Transportation of the Russian Mountain Guns.—The material of the foot mountain batteries is principally carried on the backs of animals,

while that of the horse mountain batteries is hitched with horses and escorted by horsemen. When the road to be gone over is not long, or when a change of position is all that is required, the carriage with its gun can be transported exceptionally by way to traction by means of the shaft attachment.

For the 3-pounder bronze mountain guns one horse carries the gun, another the body of the carriage and the axle, and a third the wheels and the shafts. In the case of the jointed carriage a fourth carries the trail and the cross-piece of the shafts. The ammunition boxes are carried two upon each animal.

The pack saddles of the Russian mountain artillery have, in principle, the same construction, and are composed of two arches bound together by the side bars by buckles and clasps of iron. They have on the interior a cushion formed in two parts, which is applied upon the horse by the aid of the girth and the horse cover. The breast piece and the crupper prevent the saddle from slipping backwards or forwards. The horse that carries the wheels has besides a small collar, to which are attached upon each side the shafts by means of a ring. The carriage carrier is provided with a breast collar joined to two traces. To move the piece the shafts are attached to the carriage, the wheel carrier is hitched between the shafts and the carriage carrier is hitched in front. The pack saddles have special dispositions, which vary with the nature of the load.

The gun saddle is surmounted by a small carriage composed of two parallel supporting flasks and two cross-pieces, and these flasks have two beds to receive the trunnions. The gun is placed lengthwise of the horse, the chase to the rear, and is fixed in place by straps.

The pommel and cantle of the carriage saddle have, on their upper part, rectangular places in which the flasks adapt themselves. The carriage saddle has besides two rings upon each side, in which both are placed which go through rings fixed upon the flasks of the carriage.

The saddle for the wheels carries iron axles to receive the wheels; places hollowed out in the pommel and cantle permit the placing above of the cross-piece of the shafts. The two branches of the fork are fixed to the felloes by straps. The two wheels are bound together above and under the horse's belly by straps. The shafts are fixed on each side below the wheels, and are fastened to the felloes.

The material of the horse mountain batteries is ordinarily hauled and each piece arranged with a limber and caisson. The limber is dismountable. The draft consists of four horses. The caisson is formed also of an axle, two wheels and a double sheet iron box that can contain four cases of mountain ammunition. It is drawn by three horses abreast.

If the country is very mountainous the material of the horse mountain batteries is carried exceptionally upon pack animals. The guns and the caissons are then dismounted and loaded upon the fifty-six draft horses, and upon a part of the saddle horses. It is for this reason that the former with the exception of the reserve horses are provided with a pack saddle. As to the latter, the saddle is arranged in such a manner as to carry implements, etc.

“DEFENSE OF VILLAGES AND STREET FIGHTING.”

BY THE LATE MAJOR-GENERAL C. B. BRACKENBURY.

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THE study of street fighting may at first sight appear a small and unimportant business. It has certainly been rather neglected in our Army; but all things have their times and seasons. Not long ago, all minor tactics were neglected, yet now I suppose there is not one among you who does not know pretty well how to conduct a company in most of the minor operations of war, so far as work in the open field is concerned. It happened to me once to be on the Umpire Staff at the manœuvres near Salisbury, and on a particular occasion I was riding with a brigade when an order was brought to the officer in command that he was to carry a certain village which prevented the passage of a river. His reply to the messenger was “How am I to do it?” Well, that seemed a rather curious question for a general to ask, but it is pretty clear that we must learn as junior officers what we have to practice as generals, and, what is more, the fighting of to-day gives more importance than used to be the case to the younger officers fresh from the playing fields of public schools, among which we may fairly place Sandhurst and Woolwich.

Only two years ago last spring there were some volunteer manœuvres at which some of you may possibly have been present. The portion of troops which I had the honor to command consisted of a so-called division, which was in first line and had to defend a terribly long frontage. In that line were two villages, or rather a village and a hamlet, supposed to be placed in a condition of defense. One of my two brigades occupied the village, and behind it was another brigade under separate command acting as reserve. My second brigade held the hamlet with a battalion and covered as well the right flank of the line. The enemy as I had expected attacked the village principally and the hamlet partially, indeed we had information of his movements from the beginning. One reserve brigade was brought close to the back of the village, the original flank brigade being then ordered to be ready to make a flank attack on the enemy when engaged in his assault on the village. To my astonishment the umpires seemed to think that a defended village was hardly any obstacle at all to the movements of troops, and I verily believe they would have allowed an enemy little superior in strength to the defenders to walk through that village as a knife cuts through a cheese, but that the commander-in-chief saw the confusion already prevalent in the ranks of the attack, and checked the pace at which the advance was being permitted. Here then are two examples of the need for a little more study of what it means to penetrate through streets which are defended, to say nothing of getting over the difficulty of entering the place at all. I had already a book in hand which treated on the subject, and you will not be surprised to hear that a considerable impetus was given to the work by observing what occurred at Dover.

Street fighting must be much of the same character whether it occurs in a fortified town taken by assault, as in that remarkable instance at Saragossa in 1809, and in Paris under the Commune in 1871 ; or whether it forms part of the numerous attacks and defenses of villages which are common in every war fought in countries where the villages and hamlets are well and strongly built. Hardly anything of the sort occurred in the Russo-Turkish War of 1877-78, partly because the villages there were mere hovels, quite indefensible, and partly because, for reasons touching upon their national character, the Turks when beaten seemed to acknowledge the hand of Allah and did not strive to delay the Russian march. There might have been a struggle of that sort inside Plevna but that, as you know, it was at last abandoned by the Turks, who endeavored to break through the Russian lines and had to lay down their arms outside the place. To defend a town step by step exposes the civil population to the horrors of war. The peculiarity of Saragossa was that the inhabitants, men, women and children, were so filled with the spirit of patriotism that they were ready to face any dangers and miseries rather than to yield, and the town was defended by a man fitted by nature to make use of that ardent enthusiasm which prevailed. I have often thought of what might take place in London under such circumstances, and come to the conclusion that no army which could be landed on our shores could possibly overcome the resistance of its millions if they had the heart to behave like the people of Saragossa. There is no example in history of the struggle of a free people to defend a great city street by street. Even the case of Paris in the Commune was that of a comparatively small body of armed insurrectionists surrounded by a civil population which hoped for the success of the troops advancing from outside. But war is not played out yet, and it may be given to some of you to witness the horrible but inspiring spectacle of a great city defending its freedom in the streets and houses step by step, panting with anguish, yet finally swallowing up and consuming the enemy by its very vastness.

In speaking of details it will simplify matters if we suppose the case of a strongly built village or small town on which sufficient time has been spent to make it moderately fireproof and generally defensible. Such suppositions are like diagrams ; they may or may not clearly approximate to any particular case with which we may hereafter have to deal, but we must assume a peg of some sort to hang our principles upon, and let me entreat the young officers who have all their military career before them to fill their heads with principles rather than diagrammatic cobwebs. Some details which are universal they must learn, but if they are worth anything they will be able to invent many details for themselves if once their brains are imbued with true principles, and if they will keep their minds supple, taking care not to crystallize into mere formalists. For this reason you see no diagram before you, simply because I am going to ask you to construct your own mental image, not a plan on paper, but the interior of any village, or concentrated essence of villages and small towns, just as your mind directs you.

This mental picture should consist of a main street along a principal road which you wish to close to the enemy. Parallel to it are two or three side streets ending in the usual minor roads which generally debouch on

such a place for the use of the farmers and gentry of the neighborhood, and across the whole will be other small streets some of which end in roads, others are only for the purpose of getting about easily among the houses. We will suppose these various streets partly straight, partly bending out of the straight. As the place lies principally on one main road, it is sure to be somewhat longer on that road than it is broad across it. Not far from the centre is a good solid church with a walled enclosure, and here and there are dotted about other specially solid buildings such as townhall, or the houses of what they call "warm men," precisely the spots where the warmest work will probably occur in war.

Our subject is not the defense of localities in general, and it matters not therefore an atom in what class the place to be defended is considered to be, whether isolated or in front or flank of a line of battle. Neither does it matter how the external attack and defense have been carried on. It is sufficient that the attack has succeeded so far that the assailants have seized at least one entrance to the place and that the defenders are ordered to hold fast as long as possible so as to deny the use of the roads to the attack. But the early preparation and the disposition of troops has been made with a view to this dogged interior defense, and we must therefore go back a little to the principles on which the preparations have been made.

Why has the village been prepared at all instead of throwing up works in the open country near the road? For several reasons. Some such small town or village is almost sure to occur, in civilized countries at any rate, just where important roads meet or there are bridges over rivers; for these and similar reasons the attackers want free passage there, and the defenders desire to refuse it. Then it is to be remembered that houses are absolutely impervious to infantry fire, and though artillery can set fire to them if unprepared, it may bombard for some time without killing more than two men and a boy, provided the garrison takes care not to expose itself in the outer rooms of the houses fronting the guns; in short, villages are an excellent shelter from fire even at the beginning, and every hour's work improves them, while earthworks are of hardly any use till they are finished. And what are we to say of shelter from the weather? Some of you perhaps know what it is to campaign without tents as all armies will have to do; for to carry such luxuries is to hamper their movements. All the experts in such campaigns will agree that the one thing they longed for in an ordinary climate was a roof over their heads at night or in wet weather. It is an old maxim that the worst house cover is better than the best bivouac, and campaigning is generally carried out in damper climates than that of an Egyptian desert. A village or town becomes a sort of home for its defenders, while of all the dreary, unwholesome, miserable holes to live in, an earthwork, even with field casemates, is about the worst.

Thus it is certain that villages will be quite as much used in the future as in the past, and the more so as the necessity for cover increases. The chief disadvantage urged by the more pedantic schools is that the commander cannot keep his eye on all his men in street and house fighting. Granted. But can he do so in wood fighting, or

indeed in any sort of attack nowadays, including counter-attack? Of course we all want to do it as long as possible, and to that end we had better recognize the facts of modern war and train all, down to the private soldier, to act reasonably under the original impulse given from the commander, even if complete separation has taken place and men are left to their own resources. Acting on this principle, the wise commander will try to delegate his powers so judiciously that his original instructions will be in as many minds as possible, filtering downwards through a proper medium of responsibility. This is easier to do in defense than attack, though possible for both. In our particular case the best way is to divide the defense into sections, entrusting each section to a head of its own, who should make his own arrangements, watched over at first and criticised by the commander, but afterwards to be carried out as independently as possible. Even if the village is only to be lightly held and evacuated on serious attack, the commander will still have the best hold on the situation by delegating responsibility, that is to say, explaining the situation to his subordinates, telling them what, on the whole, they are expected to do and then leaving the details to them. The long and the short of it is that if the commander does not act in this way he will find himself, soon after an action of any sort has begun, like a hen with a brood of ducklings, standing at the edge and clucking in vain to them afloat out of reach. It is important that so far as possible each section should be defended by a definite unit under its own officers. As for the size and shape of the sections they must come as they can. The ideal would be a portion of the exterior line of defense with its gardens, walls, abattis, and so on for one side, and the other two sides retiring gradually to meet each other at a point towards the centre of the village ending at a street corner. Each officer would distribute his own men and form a small rallying keep for his own section. The village itself would have a keep for the whole, namely, the strongest house, often the church, which commands some of the most important approaches. The inner reserve will hold this keep and such of the streets as are not included within any of the sections. This seems to me by far the best provision against the enveloping attack which is sure to be the method employed in assaulting a village or town. Even so large a place as Kars was enveloped in this manner when the Russians captured it and its defenses in one night.

Besides the inner reserve, every place not a fortress should have an outer reserve, the main business of which is to make counter-attacks. In some cases the outer reserve will be a portion of an army, but we shall only confuse the question if we go into all that. At any rate there ought to be an outer reserve, and in all fighting of the character which we are supposing that reserve is one of the most important features of the defense. The principle on which all the villages round Paris were held during the investment was to have a comparatively light garrison which gained time when attacked by a steady defense till reinforcements came up and fresh troops drove back the French already weary with their great efforts. These troops acted as an outer reserve. Supposing the village isolated, as a general rule you will have at the beginning a shooting line outside, which,

including supports, will be about in the proportion of one man per yard ; an equal number for the garrison, including inner reserve, and again another third for the outer reserve.

It must be taken for granted that you are all familiar with the method of preparing a house for defense, and not obliged to sit down and cry for an engineer if such work had to be done. You know how to provide against the danger of fire, and also, no doubt, in a village, that there should be spaces made here and there, if possible, so that the attackers should find themselves pulled up by an exposed opening, on the other side of which are defenders prepared to dispute the passage from fortified houses not yet touched by artillery fire. You know, also how important it is to have communications arranged, not by the regular streets, so that they may be better known to the defenders' troops, who can place sentry guides here and there, than to the attackers fresh from the outside.

There is a much debated question whether the defenders should have guns inside a village or small town. I hope nobody will accuse me of underrating field artillery as a rule, but in this case guns seem to me out of place. The value of anything at a given moment may be 'great, yet it may not be worth having during the whole of a fight in anticipation of that moment alone. Such I take to be the case with guns in street fighting and machine guns in the open field ; whereas machine guns in street fighting, provided they are light enough, and field guns in the open field, are universally efficacious. There are no doubt possible cases where guns may be used, for instance, if the main street be long and wide, and if the attacking party have made a barricade at the end they have carried, or utilized one captured from the defenders. Even then it is plain that the affair is proceeding slowly, and there will be time to send out for the pieces, which might be in possession of the exterior reserve. If the attack is able to be pushed rapidly your guns will probably be of no use at all and soon be captured.

With regard to the erection of barricades, these most useful and necessary means of defense must not be so multiplied by the defenders as to become an embarrassment to themselves. It is a good plan to decide on the best spots for them, and collect materials there, but not build more than are necessary at first, so that free circulation may be possible for the defenders. Whatever the kind of barricade, it should invariably leave room for troops to pass round one or both ends. The great principle to remember in using barricades is that applicable to all field works, namely, that they are not intended to be obstacles to an enemy's progress if he reaches them, but rather as cover from which the defenders can fire against an enemy in the open street. The same treatment which the main street requires should be applied to the cross streets and all others, for an attacking force which knows its business will most certainly try to envelop the place and attack it on three sides at once, even if that force be not strong enough to expect to succeed in all directions. Success in any fight is not produced so much by the number of men killed on the opposite side as by the moral effect produced on the remainder, and soldiers who may feel very bold against an enemy in front of them may often give up the game when the sound of firing tells that he is on the flanks as well. Yet, in

street fighting, though the enemy be even on three sides at once, he is not able to fire through the blocks of houses, and may be driven out after all, especially if well judged counter-attacks are made by the exterior reserve. The defenders ought not to retire merely because they are outflanked, but it is extremely likely that they will, unless they have had some training in street fighting, and I may be pardoned for saying that, considering how important such work is likely to be in war, our camps of instruction should have the means for giving that training.

It is most important that every man should know his own position and duties in the fight, and, however hurried the preparations may be, this part of them should never be omitted. We must try to get out of our heads the notion that the soldier is a mere machine only to be worked by a perpetual series of impulses given by his commanders. If he is so it is our fault for not teaching him better. Surely you all find in your spring training here that the British soldier is anything but a fool, and that he responds to all attempts to give him a more intelligent sense of his duties and responsibilities.

Continuing for a while to regard the fight from the defensive point of view, we must suppose the attack to have made good its footing at two or three points on the outer edge of our village, as for shortness we will henceforth call it. The first point of importance is to prevent the attackers from following closely up the troops retreating from the combat outside, and this should be provided against, not only by the action of the inner reserve fighting at barricades and by the defenders of the houses, but also by the threatening advance of the outer reserve, which will do well to make a counter-attack at this moment when the enemy is confused by the fighting and broken up by the difficulties of the obstacles which he has surmounted. At this stage the defense should be better in hand than the attack, as the defenders of prepared houses will have been kept out of reach of the artillery bombardment, which must now cease, since the attacking guns cannot fire on that part of the village which their own troops have carried. All hands should have been made to understand that a first success of the attack is far from being an end of the affair. The internal defense may last for hours or even days in spite of the enemy's numerical superiority. The first advance will be attempted by the streets and met by fire from the barricades and houses lining the streets. If, as is probable, a rush is made along the streets from the point first carried, the inner reserve should meet it by a counter-attack. We will suppose that the enemy is checked in his first attempt to rush the place. The defenders should then try to push him out again before he has time to settle down in the captured houses. If this effort fails, there will probably be a lull while the attack is securing the advantages gained and fresh troops are coming up for the street fighting. Perhaps this will be the last chance for the commander to communicate with his various sections, and he should use it by giving all possible information as to the condition of affairs to his subordinate leaders. Henceforth the best thing he can do will be to attend to the outer reserve and prepare for a series of vigorous counter-attacks.

Now comes the bitter struggle in the streets and houses, and there is no

stronger test than this of the courage, tenacity, and training of the individual soldier. In the first village fight of 1866, that of Podol, a mass of Austrians were at one time so jammed together in a side street that they could not load their rifles, which were, of course, muzzle-loaders; and numerous cases might be cited in which the heroic defense of a single house has checked a triumphant enemy for a long time. I shall presently mention an example or two, but for the moment it must suffice to say that the defenders ought to make it impossible for the attack to advance up a street beyond the point where they have carried the houses on both sides, especially the right side, as will be presently explained. And we have to remember that the groups of houses are in themselves obstacles till they are carried. Your friends may be in a side street only fifty yards away, they are of no use to you unless they or you have possession of the intervening houses. It is this fact which makes the capture of a village such a long business when well defended. If, driven from house to house and room to room, the defenders are gradually forced back along the streets, there will still remain the main keep to be defended, and this may occupy a considerable time and even be successful if the outer reserve makes a thoroughly vigorous counter-attack. In the fight for Bazeilles the Bavarians were at one time driven clean out of the village streets and back to the river by such a counter-attack, though they still retained a footing in some of the houses. And this suggests one great point in the instructions that should be given to all subordinates. The village should never be regarded as captured so long as even one house holds out. It is always a point of vantage upon which a counter-attack may rely. One of the most powerful agents on both sides is the use of fire, which may be used by one side or the other according to circumstances, direction of the wind, and so on. It is most important that each house and section should have its own means of extinguishing conflagrations, though the defenders may sometimes find it advantageous to kindle them.

We have then, from the point of view of the defense, an obstinate holding on to every point of vantage, and a series of counter-attacks to recover lost ground, the whole scheme worked by a proper chain of responsibility, sections under their own commanders, an interior reserve under separate command, and the outer reserve held in the hand of the commander of the whole: a tenacious defense culminating in that of the main keep, but not even ceasing if it is captured: plenty of counter-attacks, and, finally, a clinging to the very last house in hopes of success after all. But perhaps the best mental picture will be formed if we now take the side of the attack.

Interior Attack.—Supposing that an entrance has been effected, and some houses seized, the further advance should be as rapid as possible, and an attempt must be made to press on along the main streets. But one precaution should never be omitted, namely, to prepare against the defenders the houses which are first occupied. It is of the utmost importance that no time should be lost. The infantry should rush into the houses, if possible, before the defenders evacuate them, and search at once for any commencement of conflagration or preparations for explosion. The most command-

ing and strongest houses should then be prepared for defense against attacks from the defenders of the village, and every endeavor be made to sweep the streets. For this purpose the barricades relinquished by the defenders may often be used against them. It is evident that the troops used for making good what has been captured must be quite distinct from those who are to push on to further conquests. These latter we will call "columns of attack."

Columns of Attack.—These columns will have two difficulties to encounter:

1st. The defense from the front and sides of the street itself.

2d. The flanking fire of posts especially prepared for that purpose.

Even for advancing up a street there is a right and a wrong way. The worst way is to move solidly and stolidly up the middle of the street, for, if you do, the barricade defenders will have their best opportunity for fire, and the average difficulty of shooting from the windows of the houses will be at a minimum. Now imagine yourselves looking out of a window down a street to your right, you will find that, whether the enemy advance down the centre or at either side, the defenders cannot take aim and fire at the column without exposing a great part of their bodies. Now imagine the enemy to be advancing from your left, you will find that defenders from that position can see down the street for a considerable distance without any exposure worth mentioning, but must lean outwards a little to fire down your own side of the street. Apply this to the benefit of the attack, and it will be evident that the advance should be made either on both sides of the street or, if on one side only, then by the right side from the point of view of the attack.

Organized Advance.—Supposing the defense to be weak, the attackers should advance rapidly by all the streets leading from the base seized on entering the village. As far as possible the columns should work together, communicating by side streets and helping each other to turn barricades. But if the defense be strong and well conducted and the defenders have so occupied the houses on both sides of the streets as to fire on the rear of the attacking columns, it will be necessary to secure the ground step by step, breaking into the houses either by axes and musket butts, or even by charges of gun-cotton, which should be carried for the purpose by special parties—of engineers, if possible, though all soldiers should be taught the use of gun-cotton for such purposes.

Flanking Fire of Defenders.—A well considered defense will have established special posts for flanking fire. These may be either in the street itself or in side streets, or in the combination of the two formed by corner houses where streets cross. In the first two cases they must be carried either by a rush or by turning them first and carrying them afterwards. In the last case, and generally on arriving at important cross streets, the attack should occupy and organize the corner houses before pushing on, unless the enemy is making such a weak defense that you can press him steadily back without delay.

Defense Not Always Complete.—Here we may pause for a moment to remark that all street fighting is not necessarily the attack and defense of a

fortified village. It may be that an enemy retiring before you leaves a portion of his rear guard in a village to delay the advance of artillery, etc., along a main road. In such a case the defense may make a great show of fire from the outskirts, and you might suffer considerable loss and delay in making a front attack. Your tactical knowledge must enable you to judge the situation, and your skill will be shown in sending part of the cavalry and infantry round by the flanks while the artillery opens on the front of the village. In most cases the enemy will evacuate it, when your main body, which will be that of your advanced-guard, can push through at an increased pace. But in no case send your artillery through a village which has been occupied by the enemy without the company of other troops. A very few men remaining there might cripple your batteries for a long time by shooting the horses. In no position is artillery so helpless.

Military Notes.

CAVALRY CHARGES.

IT may be well to bring before our readers the origin and nature of the evidence on which the "cavalry cannot charge unshaken infantry" dogma is founded. It is necessary to do so, as this is essentially a question which has been prejudged, and to the detriment of what we hold actually is and should be the finest branch of our Service. The idea in England was originally started, and has since been principally maintained, exclusively by infantry and artillery officers. As regards French Revolutionary cavalry charging squares of British Peninsular infantry, no deduction could be fairer or better based. But it was and still is a mistake to jump to the conclusion that this evidence established the case universally as between the two arms; for where the rôle was reversed, and British cavalry charged French infantry, even where the latter were war-seasoned veterans, the result was, in seven instances out of eight that occurred during that war, precisely the opposite. The British cavalry (or King's German legion, as the case might be) rode over and exterminated their enemies, even though the latter are certified on all sides to have stood up to the attack in perfect order, and to have delivered their fire with coolness and *sangfroid*. What the result might have been as between British cavalry and British infantry is and always will remain an open question, for it is impossible to conceive such an occasion arising, though British infantry officers almost invariably assume it whenever they take part in discussions on the subject. Up to the end of the Seven Years' War—and, indeed, till well on into the tenth decade of the last century—cavalry had been the undisputed arbiters of the battle-field. Not only the Prussians under Seidlitz and Ziethen, but British and Austrian squadrons had again and again swept ten times their number of infantry away before them. The deeds of the Baireuth Dragoons at Hohenfriedberg, of Seidlitz' Horse at Zorndorf and at Rosbach, are too well known to need recapitulation; but the glorious part played by the 15th Hussars, in conjunction with some Austrian squadrons at Villiers-en-Couche, on April 24, 1793, and Chateau Cambresis two days later, seem to be in danger of fading out of recollection altogether. Twenty years after it had become a fundamental axiom of tactics in Continental nations, from whom we have borrowed it, that horses cannot be got to face the bayonets of a square, let alone its fire. The 15th—probably because the examination for promotion was not an established fact in those days—seemed to have found no difficulty in getting their horses to accomplish the "impossible." But, in the meanwhile, what had occurred to make the difference? The equipment and armament of infantry had re-

maintained "stationary," and it cannot be maintained that the men had improved in any way; for it is historically notorious that the reverse was the case, all Europe having been drained of fighting men, and the incessant sequence of wars having allowed no time to train and discipline them up to the standard formerly exacted. The explanation is that all over Europe—except in England—the cavalry had deteriorated even more rapidly than the infantry. The Prussian cavalry had been destroyed at Jena, thanks to its piecemeal employment with the infantry divisions; Ulm, Austerlitz, Regensbourg, and Eckmühl had accounted for the Austrians; the Russians never had any Regular cavalry worth speaking of; and the number of mounted men supported by the French was altogether below the proper proportion of artillery and infantry. Relatively to one another, they still maintained the positions or reputations already acquired during the course of the struggle. It is not much to be wondered at, therefore, that Continental nations were prepared to accept the dictum of French writers without much questioning. But that we should have accepted it as applicable to our own cavalry is most unaccountable. Nevertheless, thanks to the habit we have of never thinking for ourselves in these matters, we did so, in spite of the really glorious record our cavalry earned for itself during the war. The dogma that "cavalry cannot charge unshaken infantry" was firmly rooted in our military profession of faith even before the breech-loader appeared on the scene. What wonder, then, if our cavalry bowed their heads to the inevitable when this new implement of destruction, capable of being fired six times more rapidly, and shooting four times as far, and with considerably greater accuracy than the old Enfield, was brought into practical application? The conclusion was by no means inevitable, for the new weapon not only entailed considerable alterations in the nature of the fight itself, but it was contemporaneous with another and far more wide-sweeping change in the nature of armies altogether—viz.: the universal adoption of "short service." The increased mental strain induced by the noise of breech-loading firing, the greater number of bullets to be encountered in a given space of time, and the tenfold greater depth of ground swept by fire, have not only abolished the old close-order, shoulder-to-shoulder fighting, but have rendered the attainment of the old close-order standard of discipline absolutely unattainable in the time available. The Prussians and Germans have all along striven hardest to hold on to it. Have they succeeded? The ravine of the Maine below Gravelotte, the underwood in the Bois des Ognons, and a score of other places, could tell some tales. That French cavalry failed to make a serious impression on infantry on some occasions in 1870-71 proves nothing, for the cavalry frequently attacked under such disadvantageous conditions of ground and leading that no decisive result could have been anticipated. Yet, except at Mars-la-Tour, Vionville, and Beaumont, it must be admitted they amply gained their immediate object,—viz., time—and if it were possible to balance out exactly the amount of loss relatively saved or inflicted in the time thus gained, we fancy it would be found that each cuirassier or chasseur who fell at Woerth or Sedan paid for himself two, even three times over; and absolute loss in killed and wounded still counts for a good

deal, *pace* the "bloodless strategists." On the other hand, the Prussian cavalry charges against the long-service soldiers of the Empire, who, in point of war-seasoning and steadiness under fire, were certainly superior to anything the Germans or ourselves are likely to confront again, were uniformly successful beyond even the expectations of the leaders who authorized them. Exact statistics show that they were not paid for at a disproportionate price. How many Brandenburger infantry soldiers would it have cost to stop the advance of Canrobert's corps at Vionville, a duty carried out by Bredow's 800 horsemen with a loss of 50 per cent.? The blood-stained slopes of St. Privat may answer that question. Von Wedell's infantry brigade, some 6000 strong, lost 57 per cent. in its attempt to force back Grenier's infantry division of the 4th Corps. Yet the same division, when advancing flushed with its comparatively easy victory some few minutes after, was compelled to retire in confusion by the charge of the 1st (Queen of England's) Dragoons of the Guard, who lost some 30 per cent. only of their men. The same division proved what fighting stuff it was made of two days later at Amanvilliers. Both these results were obtained by cavalry which, from the leader downwards, thought themselves "elected" before they even moved off, and in neither case were the numbers employed at all commensurate with the object to be attained. It may be argued that all this is as prehistoric as the old smooth-bore experiences; for nowadays we have repeaters, small-bore rifles, and smokeless powder. We submit, however, that in the same time not only has the power of artillery to prepare the way increased in a far higher ratio, and the facility and intelligence requisite for the employment of cavalry in masses likewise, but also that the strain of the fight itself on the infantry—in particular the time that with long-ranging weapons they must be under fire—has rendered the latter less capable of opposing a steady front to the cavalry, always assuming that the latter are not prematurely thrown away, but are sent into the fight at a moment when the mental strength of the opposing infantry has had time to wear itself out. When that moment comes, cavalry trained to charge *en masse*, as all Continental cavalries now are, and as our own in India is rapidly being taught to do, will find the infantry as easy a prey as ever Napoleon's men on horses, employed at the same period of the action, found the Continental infantries eighty years ago.—*Army and Navy Gazette*.

THE REORGANIZATION OF THE GERMAN ARMY.

On April 1st, a change was effected in the organization and distribution of the German Army, which shows that the military authorities at Berlin are fully alive to the necessities of the times, and that they considered the military forces of Germany were in need of further strengthening. Although the changes made are described as a reorganization, they in reality represent an increase. By the Imperial orders recently issued, the number of German Army Corps has been augmented by three, the three new corps being located in Elsass, Lothringen, and West Prussia respectively. Hitherto the German Army comprised the corps of the Guards (garrisoned chiefly in Berlin and Potsdam, and recruited from all parts of the empire), fourteen army corps (located and recruited respectively in East Prussia,

Pomerania, Brandenburg, Province of Saxony, Posen, Silesia, Westphalia, the Rhine Province, Schleswig-Holstein, Hanover, Hessen-Nassau, Kingdom of Saxony, Württemberg, and Baden, and numbered from one to fourteen in the order in which they are named), and the 1st and 2d Bavarian Army Corps. The three new corps (the 15th, 16th and 17th) bring up the total number of German Army Corps to twenty. The several army corps vary considerably in composition and strength—from 21 to 36 battalions of infantry, 20 to 40 squadrons of cavalry, 12 to 25 batteries of artillery, 2 to 5 companies of engineers, and 1 to 4 companies of train or transport troops. The total effective of the twenty army corps is now 534 battalions, 465 squadrons, 364 batteries, 79 companies of engineers, and 55 companies of train. These changes of organization are intended to increase the readiness for war of the German Army, while they conform to the provisions of the so-called Septennate Law of March, 1887. Each army corps (with the exception of the 11th and 12 army corps) consists of two divisions of infantry, one brigade of field artillery, one battalion of engineers, and one battalion of train; the 11th and 12th army corps having respectively three divisions of infantry, a battalion and a half of engineers, and a battalion of independent companies of train.

The annexed table shows the present composition of the German Army:

Army Corps.	Battalions.	Squadrons.	Batteries.	Companies of Engineers.	Companies of Train.
Corps of the Guards.....	29	40	20	5	3
1st Army Corps (East Prussia).....	25	30	20	4	2
2d " (Pomerania).....	24	20	14	2	2
3d " (Brandenburg).....	25	20	18	2	3
4th " (Province of Saxony).....	24	20	18	4	2
5th " (Posen).....	25	20	17	4	3
6th " (Silesia).....	25	25	20	4	3
7th " (Westphalia).....	25	20	18	4	3
8th " (Rhine Province).....	24	20	15	4	3
9th " (Schleswig-Holstein).....	25	20	18	4	3
10th " (Hanover).....	24	20	18	4	3
11th " (Hessen-Nassau).....	37	30	25	4	4
12th " (Kingdom of Saxony).....	36	30	23	4	3
13th " (Württemberg).....	21	20	18	4	3
14th " (Baden).....	28	20	18	4	3
15th " (Elsass).....	30	20	17	4	3
16th " (Lothringen).....	27	20	12	4	1
17th " (West Prussia).....	25	20	15	4	2
1st Bavarian Army Corps.....	29	20	20	5	3
2d " ".....	26	30	20	5	3
Totals.....	534	465	364	79	55

The lowest number of batteries required by an army corps on a war footing has been generally fixed at twenty batteries; but in Germany this number is only reached by five corps—namely, the corps of the Guards, 1st (East

Prussia) and 6th (Silesia) army corps, and the two Bavarian Army Corps. It will therefore cause no surprise that, independently of the numerical superiority of the French artillery with 480 batteries (24 batteries of six-horsed guns each for each army corps), and that of the Russian artillery, which, after its reorganization, will number 490 batteries (16 batteries of eight guns each for each army corps), the question of increasing and reorganizing the German field artillery (at present comprising 364 batteries of six only partially horsed guns each) has become a most important one, and is to engage the early attention of the new German Reichstag, which met this week.—*United Service Gazette*.

HIGH EXPLOSIVES AGAINST EARTHWORKS.*

To the Editor :

SIR:—In matters of this kind empirical results are of the first importance, and the Lydd Experiments, 1888, are therefore, useful, not only in their practical bearing on earthworks and field fortifications generally, but in dispelling the erroneous and exaggerated ideas that appear to accompany every novel invention.

Many, many years ago—when some of the old fortifications were being cleared away at Chatham—gun-cotton and gunpowder charges were pitted against each other, and the results (not by any means anticipated) were slightly in favor of the old explosive. Major Clarke was probably thinking of these or some other and similar results, when he wrote the sentence quoted by Captain A. E. Haynes in the *R. E. Journal* for this month.

Theoretically, there does, I think, appear to be some “reason to expect greater effects against earth parapets from the use of high explosives” in shells as compared with gunpowder charges, but certainly not to the extent implied by the sentence quoted from General Brackenbury’s book on “Field Works.”

One litre of nitro-glycerine produces 1298 litres of gases at a temperature which tends to expand them to 10,400 litres (Nobel), and the rending force of blasting oil is to that of gunpowder, according to volume, as 13 to 1 (Eissler).

This rending force or “pressure is the factor which produces rupture of the envelope, but does not necessarily produce any extended mechanical effect. * * * This last represents the work equivalent” (Hake). In other words high explosives are superior as rending agents, but not necessarily superior as moving agents.

In this latter application the relative mechanical equivalent of explosives may usefully be borne in mind :

	Work.	Relative Value.
Blasting powder (62 per cent. KNO_3).....	242,335	100
Dynamite (75 per cent. NG)... ..	543,250	226
Blasting gelatine (92 per cent. NG).....	766,313	316
Nitro-Glycerine	794,563	323

Assuming that the high velocity shells employed in field artillery can be

* *Royal Engineers' Journal*, May 1, 1890.

charged with blasting gelatine—a rather large assumption—it would appear that theoretically they would be more efficient for levelling earthworks than gunpowder charged shells, but the question of time, so important in everything connected with explosives, probably reduces the mechanical effect of earth removal by the higher explosives, because much of their work equivalent must be absorbed by the pulverizing of material immediately surrounding the charge, such loss being almost absent in the case of gunpowder and other low grade explosives.

I am, Sir,

Your obedient servant,

April 12, 1890.

J. T. BUCKNILL.

HIGH EXPLOSIVES IN SHELLS.*

To the Editor :

SIR:—I regret to find myself—as Capt. A. E. Haynes points out—in a position of antagonism to the views of so distinguished a writer as Major-General Brackenbury ; but, in presence of inexorable facts, I am unable to withdraw a single word of the paper quoted. From the first I have carefully followed our experiments with high explosives, and there is but one conclusion to be drawn from them.

In 1885, comparative experiments were carried out with gun-cotton, meta-dinitro-benzol, and blasting gelatine, the latter being one of the most powerful explosives known. The benzol shell were those of the Gruson firm, whose representative prepared them for use. The crater results in an earth parapet convinced the ordnance committee that “little or no increase of work seems to be gained by the use of a high explosive under these conditions ;” and that such explosive is “too quick in its action for use in earthworks, but would seem to be adapted for use when a sudden and local effort was required.”

In 1887, a number of gun-cotton shells were buried in shingle and fired electrically. The craters afforded comparisons with those due to powder shells, and fully bore out the above conclusion. In 1888, Lyddite shells were tried, and the results entirely justified the opinion I have stated, which was also that arrived at by the ordnance committee. There have been other experiments at different times, affording further confirmation of this opinion. Experiments with field shells have been very recently carried out which do not point to any advantage from the use of high explosives, although Sir C. Dilke appears to think that the defenses of Quetta can thus be easily destroyed.

Against masonry, high explosive shells, provided that they can be planted in the right spot and properly detonated, will naturally be effective. Used without fuses in armor piercing shells, they may have advantages, although the fact is not as yet established. In common shell employed against ships, they have both advantages and disadvantages. In one sense their effect is greater than that of powder by reason of shock and the quantity of small splinters thrown off ; in another sense, it is less from the diminution of

* From the *Royal Engineers Journal*, May 1, 1890.

smoke and flame, and the absence of large fragments capable of causing serious structural damage, against which it is difficult to provide protection. No great preponderance of advantage has been made out, and there is nothing in melinite thus used to create a naval scare. Against earthworks, as I have stated, it may be taken as established that no advantage whatever is likely to be obtained by high explosives. In all cases except possibly when gun-cotton is employed, there appears to be a certain measure of risk, arising less from the explosive itself than from the powerful detonators required, and necessarily, especially serious on board ship.

The precise state of the melinite question in France cannot be stated. The French have adopted this explosive to a large extent; but it is certain that they have met with considerable difficulties not yet wholly removed.

Meanwhile it is not unnatural that the Press should have indiscriminately lauded the explosive on which so much money has been spent, and mere newspaper reports are responsible for the exaggerated statements that have found their way into too many books and papers.

I consider that we have never yet obtained the best possible results with powder bursters, and that in place of the long, expensive, and somewhat desultory experiments with high explosives, the development of powder-charged shells would have been wiser. This, however, is merely an individual opinion.

The question of long shells is of another kind, and in these projectiles some of the European Powers are far ahead of us. In the Paris Exhibition large numbers of $4\frac{1}{2}$ and 5 calibre shells of excellent manufacture were exhibited, and ten firms are now able to supply them.

"The future of field artillery" does not lie in the direction of high explosives, but in the development of shrapnel fire. In the latest pattern of shrapnel the French have also gone beyond us.

I am, sir,

Yours, etc.,

LONDON, April 17, 1890.

G. S. CLARKE.

SOUND VELOCITY APPLIED TO RANGE-FINDING.*

Captain G. G. Aston, R.M.A., has lately communicated a paper to the Royal Artillery Institution (*Proceedings R. A. Institution, Vol. XVII., No. 10*), giving the results of recent experiments undertaken in France and Germany to ascertain whether a sufficiently accurate approximation to the range for practical purposes can be obtained by noting the time that elapses between the flash and the report of the gun. Consequent on the statement in the official *Text-book of Gunnery* (1887), that this means of range-finding gives a good approximation, several stop-watches and sound telemeters have been invented on this principle, one of which was used with some Egyptian ordnance in the Soudan.

In the French experiments sound-velocities as high as 1,969 f. s. were registered, and in Germany 2,034 f. s., and it follows that an error of about

*From the *Royal Engineers' Journal*, June 2, 1890.

80 per cent. might be made in judging a range by this method if the sound velocity, 1,130 f. s., given in the text-book, be used.

The experiments tend to show that :

1. Sound-velocity in the direction of the path of a projectile increases with the initial velocity of the projectile.

2. The average sound-velocity diminishes with the distance of the observer, the other factors remaining the same.

Some of the results, however, obtained with the 5.9-inch howitzer do not bear out this second rule, and the apparent anomaly is explained by a writer in the *Deutsche Heeres-Zeitung* by the theory that the sound wave forms a cone with a curved axis similar to that formed by shrapnel and case shot, of which the portions near the surface of the cone move with less velocity than those near the axis. This theory is not, however, fully borne out by the trials with the 8.3in. howitzer.

In the face of these discrepancies the only certain conclusions to be drawn from the experiments hitherto made are that the muzzle velocity and the distance of the observer have great influence on the sound-velocity. The effect of wind is not ascertainable from them ; this, and the effect of different calibres and kinds of powder, of the elevation of the gun and the relative height of the observer, would be interesting points to study in any future experiments.

THE RIFLE OF '88.

Translated from N. Y. *Staats Zeitung* by Lieut. Carl Reichman, 24th Infantry.

The veil of secrecy surrounding the new rifle of the German infantry has finally been lifted by the publication of the new musketry and drill regulations. As the former contains the first reliable data of the power of the new weapon, it will, of course, excite a good deal of interest. It is to be remarked, however, that the principles of the old musketry regulations, based as they are on years of experience (it is the fourth set of musketry regulations since 1871), have suffered no alteration whatever. More stress is laid on increased instruction in musketry to correspond with the increased efficiency of the new weapon. Technically noticeable is a small change in the off-hand aiming, as to the advisability of which the opinions are probably divided, and the substitution for the present targets of one general target with rings. The regulations contain sketches of the same, also several tables in connection with the text.

This "ring target" is the logical consequence of the greater grazed zone as given by the new rifle. It does not matter whether the enemy is hit in the chest or legs so long as he is put *hors de combat*. The tendency is, therefore, to bring the bullet within the height of a man. According to the general order of November 21, 1882, preceding the text, the regulations are to apply also to the Rifles, Pioneers and Railway troops.

The initial velocity of the projectile 25 metres (1 metre = 39.37 inch) from the muzzle averages 620 metres = 2033 feet ; the extreme range with an angle of elevation of 32 degrees is 3800 metres = 4122 yards. The projectile has the following penetration :

At	100 metres	$31\frac{1}{2}$ in.	of dry pine, solid,		
"	400	"	$17\frac{3}{4}$	"	"
"	800	"	$9\frac{1}{5}$	"	"
"	300	"	a little over $\frac{1}{4}$ in.	of plate iron,	
"	100	"	$35\frac{1}{2}$ in.	in newly thrown up sand,	
"	400	"	$19\frac{7}{10}$	"	"
"	800	"	$13\frac{3}{4}$	"	"
"	1800	"	$3\frac{9}{10}$	"	"

To protect against infantry fire a breast-work of earth must be at least $29\frac{1}{2}$ inches thick.

The musketry regulations contain sketches of such hasty intrenchments as can be made with the spade, the dimensions given being the smallest consistent with safety, in order that they may always be observed as the prescribed normals. Thin brick walls give but incomplete protection, as they are penetrated if struck in the same place by several bullets. It might have been added what dimension is meant under "thin."

The fixed sight is for ranges up to 300 metres, the flap sight to 400 metres. At a range of 600 metres the dangerous space for a target 47 inches high is 79 yards, for one 5 feet 7 inches high 122 yards, and for one 6 feet 6 inches high 157 yards. Using the fixed sight, all targets up to 6 feet 6 inches high are entirely within the grazed zone up to 300 metres, using the flap sight all targets from $33\frac{1}{2}$ inches to 6 feet 6 inches high. Hence the extraordinary power of the rifle of 88.

The regulations of 1888 for the infantry have "as reprint of 1889" again been published as supplement to the musketry regulations. Changes occur only in those parts relating to the construction of the new rifle and to the new powder. They occur, therefore, almost exclusively, in the first part treating "of the school"; the second part, treating of "battle," is only so far touched upon as to eliminate all considerations for the smoke, which, so far, played an important part in the "direction of fire." The distances for all objects have in accordance with the superior grazing power and range of the new rifle, been considerably increased; the third part, treating of "parade," has not been changed.

The regulations show that there are many new terms for the parts of the rifle of 88, which must be mentioned during instruction. We mention: "the barrel cover" (the rifle is provided with a cover for the barrel as protection against its heat), "cartridge frame," holding four cartridges, an improvement on the old magazine. As for the rest, the rifle of 88 is a "multiloader" proper, while the one of 84 was a single loader, with a magazine for special purposes. As the magazine exists no longer, the instructions for loading and the kind of fire to be used had to be changed and, partly, very much simplified. For instance, the emptying of the magazine formerly prescribed has disappeared, and so has the name "magazine." Five paragraphs of the first part could thus be struck out; it now contains 224 paragraphs against the former 229. The kinds of fire are: volley and individual fire; the latter as to its rapidity is divided into slow, quick and rapid fire. This old trefoil, changed for a short time by the magazine fire,

has therefore been reinstated, and magazine fire been replaced by rapid fire.

(Translation.)

DAS INFANTERIE GEWEHR '88. BERLIN, 1890.

The Ammunition.

The ball cartridge consists of the cartridge case, the priming cap, the powder charge, the cardboard wad and the projectile.

The cartridge case is of brass and bottle-shaped, and provided at its rear end with a groove for the ejector. At the middle of its base is the priming chamber with two fire openings and the anvil for the priming cap.

The priming cap is of brass and contains the priming composition, which is covered with tin foil.

The powder charge consists of 2.5 grammes (=38.6 grains) of a brownish small-leaf powder, which occasions much less smoke and noise than the ordinary black powder.

The cardboard wad separates the powder charge from the projectile.

The projectile weighs 14.5 grammes (=223.76 grains). It consists of a hard lead core pressed into a cover of steel plate covered with copper-nickel or nickel-copper plate. It is cylindrical with a blunt head. If it were not for this cover, the long lead projectile could not follow the rapid twist of the groove; and then, on account of its very high velocity (620 metres = 2033 feet in the first second), its form would be changed and its penetration reduced.

Ratio of weight of powder to that of projectile = 1 to 5.8.

The blank cartridge consists of the cartridge case, priming cap, powder charge, wad, and the hollow wooden projectile.

The drill cartridge consists of the cartridge case and the brass head, which takes the place of the projectile.

The ball cartridges are packed five in a case, three cases to a box. The man carries two boxes in each of his front cartridge pouches and six in his rear one—in all 150 cartridges. These weigh, all told, about 5 kg. (= 11 pounds). Hence the musket is very light, weighing only 3.8 kg. (= 8.5 pounds).

UNVEILING THE ROYAL ENGINEERS' GORDON STATUE.*

The statue, as most of our readers are aware, is of bronze, by Mr. Onslow Ford, A. R. A., and represents General Gordon seated on a camel. He is dressed in his uniform as Governor General of the Soudan, and wears his orders and medals.

He carries the historical rattan in his right hand, and with his left he is reining up the camel, which throws the animal's head back and gives him a fine pose. The statue is 12 ft. 6 in. high, and the pedestal, which is of Portland stone, is 5 ft. in height; there is an outside curb of Portland stone; the space between this and the pedestal is planted with forget-me-nots, with groups of arum lilies at each corner; this little garden forms part of the

* From the *Royal Engineers' Journal*, June 2, 1890.

design of the pedestal. Around three sides of the base of the bronze is introduced the names and places with which Gordon was identified, and in the front the one word "Gordon."

The inscription on the pedestal reads as follows :

CHARLES GEORGE GORDON,
Royal Engineers,
Companion of the Bath,
Major General of the British Army,
Mandarin of China,
Pasha of Turkey,
Governor-General of the Soudan,
Born at Woolwich, 28th January, 1833,
Killed at Khartoum, 26th January, 1885,
Erected by the Corps of Royal Engineers, 1890.

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that as far as practicable these "Comments" should appear over authors' names.)

I.

"Historical Sketches of the Army."

Captain J. P. Schindel, 6th Infantry.

AS Colonel Anderson, in his historical sketch of the 14th Infantry, does not advert to the combat which took place at the Peach Orchard, Gettysburg, July 4th, and in which his regiment took part—a combat that was continued, later, as "picket-firing"—a few pertinent facts may not come amiss.

Pretty early in the forenoon of July 4th, the First Regular Brigade, under Gen. H. Day, was ordered to the front, to "feel" the enemy: leaving the position occupied during the 3d, in rear of the Little Round Top, by the road leading to the Orchard, the column, just before reaching the Wheat Field, was deflected to the right to secure the shelter of the woods; reaching the outer end of the woods the brigade was formed in two lines—the first, composed of the 3d, 4th and 6th Infantry, commanded by Captain (now colonel) Bootes, and the second, composed of the 12th and 14th Infantry, *I think*, by Major Giddings, and, covered by Captain Thatcher's Co. of the 14th, advanced in this order toward the Emmitsburg Turnpike—the skirmishers penetrating the Peach Orchard, the first line halting at its edge, and the second, in the open space intervening.

Stray bullets had been falling amongst the troops before leaving the woods—one wounding Lieutenant Crowley, 4th Infantry—and as soon as the skirmishers emerged from its shelter, a brisk exchange of fire began, which was kept up for about an hour, after halting, men detached from the flank companies of the 6th and 14th, meanwhile replying to the fire from the left, opened by covering parties of the enemy, ensconced behind stone walls and small redan shaped shelters made of stones and fence rails.

About 11 o'clock, finding the lines exposed to enfilading artillery, the brigade was ordered to retire, which it did under fire from a rebel battery posted near the Fairfield road, and which was answered by the Federal battery on Little Round Top—this being the last artillery firing at Gettysburg. Almost reaching its original position, the column faced about and proceeded to establish a "picket line"—really a line of skirmishers in groups—along the edge of the woods to the left of the Wheat Field, through the "Devil's Den," and along the open crest of Plum Creek, between the two Round Tops. As soon as the rain, which had been falling in torrents, ceased, picket firing began, which lasted till after dark, the 14th Infantry, if not the last, certainly among the last, who fired upon the enemy at Gettysburg,

During the night of the 4th the last Confederates left, and early on the morning of the 5th a skirmish line was advanced—Benedict's Company of the 4th, and Company "I," 6th Infantry, being part of the force from the "Devil's Den" to a point beyond

the Emmitsburg Turnpike, and near the Fairfield road, a force of Confederate cavalry and artillery being *reported* in sight on the latter road.

FT. GIBSON, I. T., July 28, 1890.

II.

"A Regimental Court of Honor."

Captain J. G. D. Knight, Corps of Engineers.

IN the May number of the JOURNAL, the need of "something of the kind" was taken for granted.

What is to be corrected by such a court? In general terms it was stated that the honor of the brotherhood of officers is being allowed to suffer from neglect, to go by default. The particulars given were:

1. That the reviewing authority has often reversed or mitigated a sentence of dismissal for conduct unbecoming an officer and a gentleman.
2. That sentences of dismissal of cadets for lying have been set aside.
3. That Congress has restored to their grade and rank culprits who have been cashiered.
4. That members of courts-martial have recommended to clemency, those whom they had sentenced to be cashiered.

5. That there is too little observance of the rules of courtesy and official etiquette and too much disposition to find fault, to grumble and to give utterance to our thoughts of our superiors in rank, our commanding officers, our comrades.

Did it occur to the author that drawing up details 1 to 4 inclusive may be considered as verifying the fifth particular?

What is the remedy proposed? A Regimental Court of Honor. Right here let protest be made against the regimental feature. What we should have at heart is not the honor of any particular regiment, but that of the entire army. Moreover customs of service may creep in and be considered honorable here and dishonorable there, Better then for both reasons, that courts be not regimental.

It is unnecessary to consider more than one feature of the proposed courts. Are their proceedings to be subject to review? It is stated that in the German service, the Emperor is the reviewing authority; and in the Austrian, for the courts considered, the commanding general of the division. Evidently reviewing authorities are contemplated; hence courts of honor will not end details 1 and 2.

Members of a Court of Honor may recommend to clemency as well as those of a court-martial. So far as the fourth detail is concerned, Congress would be no more influenced by the one court, than by the other. What remains then to be remedied by the Court of Honor? That embraced in the fifth detail. When the matter there mentioned is thought worthy of notice, some officer must initiate proceedings by a so-called Council of Honor. This council resembles our Court of Inquiry, and what says the 115th Article of War of the objections to such courts? That they "may be perverted to dishonorable purposes," that they may be employed "as engines for the destruction of military merit." These being their dangers, what follows? "They shall never be ordered by any commanding officer, except upon a demand by the officer or soldier whose conduct is to be inquired into."

There is no place in our Service for the Council of Honor. The Court of Honor is no more nor less than a disguised court-martial; and courts-martial are sufficient for all ends to be obtained by Courts of Honor. They will be found so, just so soon

as officers generally will prefer charges against those whom they know to be guilty of conduct unbecoming an officer and a gentleman.

WASHINGTON, D. C., June 21, 1890.

Colonel John Hamilton, U. S. Army.

The Council of Honor (*Ehrenrath*) of the German army is a most excellently suited institution to that people. Probably in the army of no other nation is the idea of the soldier's descent from the chivalry of the middle ages so well preserved or cultivated. In no period of Germany's latter history has the idea of the soldier being the servant of the people had any acceptance in the public mind. The army is nurtured as the right hand of imperial authority first, and next, as the aggressive force of the nation. Although the commoner regards it with pride—its successes are his—yet it is useless to deny that he looks with jealousy upon its social and legal immunities. If, as in our country, its organization sprang from the people, it is not doubtful that its peculiarities would be materially affected.

With other matters (which follow) this *Ehrenrath* came over from knighthood as a thing to be carefully preserved to the *militaire* as an honorable distinctive appanage, not admitted to the commoner.

Another, like inheritance, it is believed few of us would not accept, namely: That every officer before being gazetted to a regiment, must be accepted by the officers thereof. What a heresy this would be to our political appointing powers! The German army can protect the purity of its *cadre* against the imperial will, while our Army can be debased by the place-demanding of the lowest *heelers*.

Again, if in our Army some like checks (not financial but character checks) were placed upon marriage, as are inherited in the German army, the number of scandals and heart-burnings might be reduced in the Service. However it may be with a man in the outer world of civil life, no officer has a right to bring into the "brotherhood of officers," into the close circle of army life, where there is so much domestic interdependence, a wife whose record may be the subject of life-long criticisms and heart-burnings.

The Prussian soldier holds over from feudalism another inheritance, in close alliance with *Ehrenrath*, immunity from civil process. Many believe that the interests of justice would be greatly enhanced by a similar rule in our country. Certain it is that the soldier arraigned before a local civil court has to face a vast amount of prejudice; whilst in the other case, it is known that irregularities of the soldier which affect his civil surroundings are met with rigor by courts-martial.

The principal questions that occupy a Council of Honor (a kind of grand jury) fall under two classes—I. The cases where it is to be determined whether or not the *duello* shall be the arbiter. II. Where it is to be determined if charges and court-martial shall follow alleged acts.

In our country, in its present state of public feeling and of law, it is useless to consider the court's province in the first class.

The *Ehrenrath* might strengthen weaklings in an effort, through ostracism, to drive an unworthy man from a regiment, but such combinations would be very dangerous to the parties should civil law lay hold of them.

The vicious reappointments complained of by the author have no doubt lowered the tone of the Army, but it is not seen how a Court of Honor, helpless as against Executive power, could remedy this. As to recommendations to mercy by jurors, the present writer cannot agree with the author; charity and mercy will win in the end, if they be not used to screen unreformable vice. Still, it must be admitted that there is much injudicious sympathy. Yet, men of this softness of character are often known

to indignantly "cut" and ignore vicious parties, whom the stronger minded class tolerate freely till the opportunity comes to throw them overboard under the screen of court membership.

As to the oft quoted higher tone of the "old Army," it must be accepted with considerable qualification. That army was certainly more homogeneous, and being smaller, it was more easily ruled by a more quickly formed public opinion. But the "old Army" had its own scandals, selfishness, and unworthy perversions of duty. To ameliorate present evils probably the best way would be for each officer to bear himself toward an unworthy member as a high sense of duty should direct. Combinations are certainly dangerous, and a Court of Honor would be as likely to err *under an organized prejudice* as to reach truth or justice. Above all keep us from a regimental honor court. In a great majority of the matters that would fall under its investigation, long and complicated entanglements would render unravelling impossible, and it would leave resentments behind more embittering than the original situation.

An apposite case which may interest the present generation is that of old Major Martin Scott. Scott was a man of no culture, crude in his manners, and to the young fellows of his regiment painfully economical. A big Vermont boy, something in a service about the end of the war with Great Britain, procured him a commission, and on his transfer to the 5th Infantry, the regiment determined to get rid of this uncouth specimen. They heaped every insult upon him, till, without sympathy, he confined himself to his own quarters and lived surrounded by his guns and dogs, about the only creatures then left him to talk to.

As he persistently did not resign, at length a young officer, well advanced in consumption, determined as a parting gift to the regiment that he would challenge Scott and thus force on him resignation or a bullet. To the astonishment of most, Scott accepted the challenge as a great relief, and went out with an inimical second, and followed by just one sympathizing friend, his old negress cook. He came back as the admired shot of the regiment; they discovered in him heretofore unknown virtues of head and heart, his simplicity and economy of life became quite the boast. Marryat immortalized in story by the dialogue of Scott and the 'coon—"If you are Martin Scott, don't shoot; I'll come down." He feared nothing, and under a conviction of invulnerability performed wonderful feats of valor in Florida and Mexico; and after a life honored and beloved for its gentleness and truthfulness, in his mature days died gallantly leading one of the charges at Molino del Rey.

The present writer remembers another case of his personal acquaintance where an officer would have suffered heavily from any regimental opinion in his youth as an abolitionist. His challenges were sneered at because *he could get nobody but an orderly to carry them*. Yet this officer came out an honored man whose sword played no small part in the late Rebellion.

One reason why the "Court of Inquiry" is so unsatisfactory is probably that it is so seldom granted. Just in the cases where it might do the most good, it is oftenest refused; where the inferior suffers from imputations of the convening authority. But, after all, honor courts are intended more for matters not covered by the Articles of War, and a Court of Inquiry leaves out as much as possible, what may be termed socio-domestic questions.

As to the libertinism in the criticism of superiors, it is to be feared that in free America we will never be entirely free from it. The smallness of our Army (that "the Adjutant General can carry in his pocket") has something to do with this. Since the days of Old Organization himself to the young second lieutenant, the "Old Man" is an old fool, as is the ship's captain to the middy. The only corrective is probably good taste. Something may be hoped for from a greater regard paid by superiors to

intermediate authority. For a colonel to operate in a company without advisement of the captain, or for a general to operate in a post regardless of its commander, "are nuts to the juniors."

It is to be regretted that there could not be a code of honor planted in every officer's breast, to strengthen him in giving the cold shoulder to those acknowledgedly too base for their commissions, or in softer words to men out of their place. But it must not be forgotten that we are only human.

It is very desirable to keep our professional standard up to the demand of our master, the public. As some means to this end we might name :

1. Individual purity of character.
2. Constant readiness and fitness for the performance of every duty.
3. Respect for law.
4. Studiosness. Following a useful companion study to that of our profession is an excellent thing. Law, medicine, chemistry, electricity, mechanical engineering, finance, *vel al*, will make us more useful members of society while in service as well as upon retirement.
5. A hearty coöperation with the civic public of our immediate neighborhood in advancing local interests.
6. Closer inspections by the proper authorities as to the qualifications and conduct of officers and as to their attention to the fixed course of military studies.
7. Examination for promotion.
8. Enough men in the companies to make drills interesting and instructive.*
9. A determination on the part of every officer to help every new commander to carry out his policy of reform or advance, rather than a sullen holding to the old. In regard to this it may be safely said that the baneful examples of the Rebellion War have been many times duplicated in every post and regiment of the Service.
10. If the young in their criticisms of their superiors should always have a squib at their elbow it might do them some good. Derby and General Nathaniel Lyon, then a captain of the 2d Infantry, were of the same mess at Monterey, Cal. Lyon, through some real or imaginary wrong received, was a bitter enemy of General Scott ; never failed to abuse him on any and all occasions. The mess got tired of this. So, one day, when Lyon was in the midst of a tirade, Derby rested his head on his hands, and fixing Lyon with his eyes, said in low and measured terms : "Captain Lyon, don't you think General Scott would feel very bad should he know what you thought of him?" The laughter that followed was a salutary lesson to Lyon.

11. In some commands women have much to do with the insubordination. It reminds one of a battle of tortoises, each one hissing and stretching its neck to overtop the other. Officers might spend some of their time profitably in teaching their wives that civility to the wives of superiors will in no way compromise the rank of their ladyhood.

*It seems doubtful if we have improved upon Jethro in organization. Under his advice Moses divided Israel into tens, fifties, hundreds, and thousands, and appointed judges and chiefs over them—sergeants, subalterns, captains, and colonels—Num. xviii. The big German company gives an actual field-officer but captain's pay, and it is forced upon their service from the paucity of officers able to come up to their standard.

It would be strange, and it is not impossible that some of our bugle calls were those of Moses and Joshua. In the wilderness the movements of the host were directed by the trumpet, and as its notes are few, calls would be apt to be retained and transmitted if sufficiently distinctive.—Num.

III.

"Mackenzie's Last Fight."

First Lieut. O. W. Smith, 22d Infantry.

I HAVE read Captain Bourke's interesting article on "Mackenzie's Last Fight with the Cheyennes," in the January and March numbers of the JOURNAL, also the comments upon the same in the March number, by Major Baird. The latter says: "The truth of history and justice to the troops engaged requires a correction in one particular." This very reason requires a correction in another particular—of action taken by troops cantoned at Glendive, on the Yellowstone River, and which seems to have been lost sight of. On October 10, 1876, an escort to a wagon train, consisting of four small companies of infantry, left Glendive for the cantonment at the mouth of Tongue River. That night camp was made on a creek about fourteen miles distant. At about three o'clock the next morning the camp was attacked, with a galling fire, by a large number of Indians, which attack was repulsed, but the mules became excited and many of them broke loose, over forty of them escaping from the corral and falling into the hands of the Indians. The train was so crippled and the Indian force growing so in numbers by recruits, that the command was compelled to return to Glendive. The Indians pressed them so that it was almost impossible for them to get out of camp. It was there that Captain Malcomb McArthur, 17th Infantry, now deceased, who had command of the rear guard, displayed courage and ability in bringing up the rear.

Upon the return of the train, Col. E. S. Otis, the commanding officer at Glendive, reorganized it (eighty-six wagons) and on October 14th set out with it for Tongue River, with a command consisting of Companies C and G, 17th Infantry, and G, H and K, 22d Infantry, 11 officers and 185 enlisted men. The following morning at 7 o'clock, this command was attacked by several hundred Indians. They acted in the most dauntless way, charging up near the skirmish lines, which had to be advanced a thousand yards or more from the train, to save the mules from their bullets. The Indians took a defiant stand in front, which had to be opened by repeated charges, and the rear was sorely pressed by them. This was kept up until 7 o'clock in the evening, when the command went into camp, having marched during the fight about twelve miles. The Indians attempted every artifice to defeat the troops and capture the train; they set fire to the grass, the fire running through the train, and they endeavored to advance under cover of the smoke; the soldiers also took advantage of it, advanced and took the Indians at short range. By the time the corral was made they drew off, seeming to be exhausted, remaining for the night, however, within sight and hearing. They could be seen by the light of the prairie fire riding around like so many devils. That night the troops lay in rifle pits surrounding the train, made with intrenching tools, which they carried; they were cheerful and happy after getting their coffee. No morning ever broke more beautifully than the next one. The Indians again in large numbers, and formed in solid masses, confronted the command. One of them was delivering an harangue, which in the still, clear morning, could be distinctly heard by the troops and understood by the interpreters. It was then, as the train advanced, that the following letter from Sitting Bull, written by one of his half-breed followers, fastened to a stick on the roadside, was discovered:

"YELLOWSTONE.

"I want to know what you are doing travelling on this road. You scare all the buffalo away. I want to hunt on the place. I want you to turn back from here. If

you don't I'll fight you again. I want you to leave what you have got here, and turn back from here. I am your friend,

"SITTING BULL."

"I mean all the rations you have got and some powder. Wish you would write as soon as you can."

The commanding officer informed the Indians, through an interpreter, that he had nothing to say in reply, except that he intended to take the train through to Tongue River and that he would be pleased to accommodate them with a fight. The Indians did not fire a shot, and shortly afterwards a flag of truce appeared and a few of them were admitted inside the lines. They said they were tired of fighting and wished to conclude peace. Colonel Otis advised them to visit Tongue River for that purpose.

In Colonel Otis's report of this engagement, referring to the departure of the Indians bearing the flag of truce, he says :

"The train moved on and the Indians fell to the rear. Upon the following day I saw a number of them from Cedar Creek, far away to the right ; after that time they disappeared entirely. Upon the evening of the 18th I met Colonel Miles encamped with his entire regiment on Custer Creek. Alarmed for the safety of the train he had set out from Tongue River upon the previous day. I told him of the situation of affairs, and informed him that he would find the Indian camp either about the mouth of Cabin Creek or far away on his left travelling in the direction of Fort Peck. * * * In concluding this report I cannot speak too highly of the conduct of both officers and men. The officers obeyed instructions with alacrity and executed their orders with great efficiency. They fought the enemy twelve hours and fired during that time upwards of seven thousand rounds of ammunition. They defeated a strong enemy, estimated by many at from seven to eight hundred, who had defiantly placed himself across our trail with the deliberate purpose of capturing the train, and gave him a lesson he will heed and never forget."

This was the first fight of any moment that occurred after the Custer massacre. It was a decisive victory for the troops, dismaying the Indians to such an extent as to break their spirits and make them feel that they might as well give up hostilities, and no doubt led to the surrender of many of them.

FORT KEOGH, MONTANA, April 21, 1890.

IV.

An Episode of the Sioux Campaign, 1877.

By an Enlisted Participant.

THE massacre of General Custer and his troops had aroused such a spirit of vengeance that all the forts, in the far West, were in a state of excitement ; and every preparation was made for the coming spring campaign. Companies of cavalry were increased from sixty to one hundred, and everything was put in readiness for expected commands. So that when orders came in March to the commanding officer, Major Brisbin, at Fort Ellis, from General Miles, to join him at Fort Keogh for a summer campaign, all was bustle and preparation, and although we did not know where we were to go, or what tribe we had to fight, still Indians were at the end of the journey and a winter of comparative quiet gave a zest to the expedition. We left Fort Ellis the last of March, four companies of the Second Cavalry, F, G, H and L, Captain Ball commanding. Crossed the Divide of the Rocky Mountains to reach the Yellowstone, which we had to follow down to reach our destination. As we

had a pack-train and mule teams, six mules drawing a heavy wagon, and much camp equipage, our progress was necessarily slow and laborious. Some days we made a good march, while others were very small, as the spring storms at that season had swollen the streams to floods, and made ordinarily easy roads impassible. In addition to this raw recruits had to be trained and broken in ; so that it was a full month of weary marching before we camped three miles from Fort Keogh to recruit both men and horses. After this needful rest, putting the soldiers and horses in good order, we passed in review before General Miles, who said it was as fine a body of troops as he ever saw and he would not hesitate to go anywhere with them. The 1st of May saw the troops and baggage train in motion up the Tongue River, a stream of about sixty-five or seventy yards wide, rising in the Bad Lands, and at that time very muddy and turbid from the recent freshets ; and like all Western rivers, was thickly wooded at the water's edge. So wild and rugged was the country that the mules and oxen labored up the narrow valley of the stream with their creaking wagons. The command was composed of four companies of the Second Cavalry, together with some of the Fifth and Twenty-second Infantry. All save the officers were ignorant of the object and end of the expedition, except that some band of hostiles in some wild valley had to be surprised and conquered.

Five days we journeyed up the Tongue, the advancing spring covering up some of the bleakness of the landscape and spreading a green enamel over the bottoms of the valleys and the edges of the river. On the sixth day we left Tongue River to join the Rosebud, a much smaller stream, whose banks were profusely covered with the wild-rose, which at that season of the year was in full bloom. The sight, from a commanding hill, of this tributary winding in a serpentine way with its flowery borders, gave pleasure to the troops, who hailed with delight this vision of coming summer.

At noon an old Indian camp, which had been used during the foregoing winter, was reached ; old bits of hide and fresh bones and meat showed that the camp-fires had been but recently vacated, and blackened brands looked as if they had been but lately burning.

Orders were given to dismount at the old camp, unsaddle horses, and take a rest. At the same time preparations were made for an advance. Other orders were issued to commissary sergeants to issue four days' rations to each man to be carried on the saddle ; that is to the four companies of the 2d Cavalry who with the scouts and a few citizens were to form the party. A word here may be given to nondescript persons who always follow and are found on such a campaign. These are always the Indian guides, braves who constantly thirst for the blood and scalps of some tribe they are always at war with, and who would and could guide our troops to their mountain fastnesses. In this case they were Cheyennes, who were ready to put on the war paint against the Sioux. In addition to these were two half-breed guides, brothers, named Jackson, who combined the craft of the Indian to the intelligence of the white. Besides these were some citizens from Miles City who doubtless had some private grudge to settle, and some teamsters had also volunteered mounting their own mules ; one of them afterwards proved himself to be quite a warrior mounted on his small black mule, showing much prowess and valor. The wagons, moreover, were left behind, the ammunition being packed on the backs of sure footed mules. Before the troops started, two scouts—one a Cheyenne, the other one of the half-breeds—went ahead, following the Indian trail over the mountain in order to locate the village. The troops started at two in the afternoon, marching carefully and silently. The way led through rough, steep defiles, with very insecure, perilous footing, so steep that one mule loaded with ammunition fell and rolled over into the abyss below. General Miles, with one or two scouts, went ahead and carefully looked over the crest of each hill

and mountain in the valley below while the troops halted. Then coming back a hurried consultation would take place before the column moved on again. Every precaution had to be taken to guard against the sharp eyes of Indian stragglers who might be prowling about the concealed village. The first scout not having returned. Just before dark the halt was made, and camp pitched on the slope of a hill. Strict orders were given not to make any fires, to avoid loud talking, laughing or singing. Horses were closely picketed, half lariat, every man having the order (if aroused suddenly) to go at once for the horses. A cold supper of bacon, hard tack and cold coffee was disposed of. Then every trooper laid down fully dressed, ready to be summoned at a moment's notice. Strict guard was kept until 2 A. M., when the word came to saddle up. It was confusing in the darkness of night to do anything silently and expeditiously. But without noise and confusion the silent, determined troopers marched off from two until five. During the night the scouts had returned with the news that the camp, unsuspecting of danger, was just ahead. They had viewed it from a neighboring hillock, and had watched for hours the Indians racing their ponies in the meadows below. Little did these wild jockeys of the plain think that ere another sun had set their steeds would be driven before their enemies and they homeless on the mountains. But to return to the silent column which was halted behind a butte which concealed but a few miles ahead. Orders were given to dismount, see to the saddles, tighten the girths, load revolvers, make everything ready for a speedy conflict. Advice also was given to the men to keep cool and firm, and not be too eager or hasty. General Miles then put Captain Ball in charge of the battalion, and then it was decided that Company H was to charge the camp, the other three companies following as reserves. Orders were also given that no two troopers should keep together, should pass through the village firing into the "tepees" as low as possible; then when beyond 500 yards dismount and close on the camp on foot.

Slowly the companies defiled around the butte, into the valley. Muddy Creek like a serpent rounded back and forth in many a turn, and beyond this natural watery defense lay the silent lodges, cold and grey in the light of the early dawn. No smoke curled up from the open tops, not a dog barked, and from a distance it might seem a village of the dead. When within two miles the word was given for the chosen band to charge, and dash through windings of the stream at a run, in order not to sink into the miry bottoms of the creek. Before the dashing troopers had covered half the distance the Minneconjous had taken the alarm, and were seen flying in all directions from their lodges, and scrambling up the steep sides of the mountains. Taken thus by surprise, they fled, leaving everything behind, and the yelling soldiers soon were in possession of the camp. As General Miles rode in an Indian confronted him with the word "How," keeping his blanket tightly wrapped around him. As the General gave the answer "How," he threw back the blanket, raised quickly a Winchester rifle, and fired. The motion warned the intended victim, who dodged quickly behind his horse's head, and the ball lodged in the heart of a trooper named Stringer, who was immediately behind. This man was one of the four that were killed in the fight, the other three being shot pursuing the flying hostiles in the mountains. It is needless to say this warrior paid at once for his temerity, his body being literally riddled with bullets. The Indians lost about fourteen, among them their chief, Lame Deer, who followed in the rear of the frightened women and children. After the fight was over the doctor cut off his head, and tried to borrow one of the camp kettles to boil this warlike trophy into a pathological specimen.

While the village was thus invaded and surprised, the other troops made a detour and surrounded the cavallada of ponies. These, of course, are of the utmost importance to secure, as the loss of their horses render the Plains' Indian comparatively harm-

less. The herd consisted of about four hundred and fifty ponies, the youngest and wildest of which were shot, while the older ones were used to mount the infantry—who thus found themselves suddenly mounted, but on not very docile or tractable steeds. As the herd was being driven together and the troopers and citizens were scouring the hills to dislodge any skulking brave, word was brought that a warrior was ensconced in a hole defending himself with his rifle; fearing he might prove a dangerous neighbor, several started to silence his battery. A few well-directed shots laid him in the dust, when from a low bush a figure rushed, waving what was thought to be a rifle, and making for the hills, a half-breed near by sent a bullet into its head. A wild leap and a plunging fall was the result, and then and not till then was it discovered that the flying brave was an aged woman with a long staff, who had been guarding her wounded son who had so desperately defended himself in his rifle pit. Thus it is that in every battle some one unfortunate thing happens that often mars a victory. When the scattered companies came together—had buried their dead, and looked after the wounded and bleeding—fire was put to the buckskin tepees, and soon the quaintly pictured wigwams were in flames. No doubt the owners looked on with rueful faces from distant points, and meditated dire revenge as they watched their smoking lodges.

A short march of eight miles from the scene of the battle brought the weary soldiers to their welcome camp, which, however, they were not to enjoy, as a drenching rain set in, and the late enemy followed the victors and poured into the camp a random fire through the night without, however, producing any bad results to horses or men, except making them keep up a ceaseless vigilance.

V.

“The Place of the Medical Department in the Army.”

Captain James Chester, 3d Artillery.

LEUTENANT-COLONEL WOODHULL of the Medical Department seems to be dissatisfied with the title of surgeon, and severely condemns it in a paper which appears in the *JOURNAL OF THE MILITARY SERVICE INSTITUTION* for July, 1890. The chief objection to the title seems to be, that it is only semi-descriptive. He prefers and argues very ingeniously in favor of a military title for medical officers, but we hardly think he succeeds in establishing his case.

A medical man who receives a commission as assistant-surgeon in the Army, is at once invested with the rank of first-lieutenant, and according to Colonel Woodhull's views, should thereafter be addressed, officially and socially, by the military title. The colonel gives several reasons for this in the course of his paper, some of which we shall notice later on; but for the present let us confine our attention to the one already stated, namely, that the title of surgeon is only semi-descriptive. We shall not appeal to philology for the origin, history and meaning of any of the titles, medical or military, which appear in the case; or argue against the desirability of descriptiveness in titles, although much might be said in that line. We concede the desirability of descriptiveness for the sake of getting sooner to the point, and ask, wherein the title of assistant-surgeon is less descriptive than that of first-lieutenant? A lieutenant in the military service is, and always has been, the assistant of a captain; the assistant-surgeon would not be correctly described in that way. The title awarded in his commission is, if not more descriptive, certainly much more suggestive of the functions of his office, than the title which Colonel Woodhull would like to borrow from the line.

But, it may be said in reply, an assistant-surgeon of less than five years' service, is

legally invested with the rank of first-lieutenant, and has the right therefore to the title. Now, while we admit the rank, as legal and indisputable, we maintain that its character is tainted by the statute which deprives it of the full functions of command. It is not military rank proper, because of the limitations of the law, and was never intended to be. It is a kind of latent rank which legally adheres to certain commissions, and was put there, merely to protect the pocket and the dignity of the officer, and not to confer on him either place or title in the hierarchy of command.

Again, when five years' service entitles him to the rank, pay and emoluments—but not the title—of captain, he receives no new commission. The latent rank inherent in his original commission is legally increased so as to secure to him the dignity and emoluments awarded to captains of cavalry. But he is not a captain of cavalry, nor of anything else for that matter. He is simply assistant-surgeon, just as he was before.

And here it is pertinent to ask: What is it that confers a military title? A lieutenant may command a regiment and remain a lieutenant. To call himself, or even to suffer himself to be called colonel, even under such extenuating circumstances, would be arrogant assumption and bad taste. Manifestly command cannot confer a title. Again, an officer sees his nomination and confirmation to a new grade in the newspapers. Can he legally sign his name as of the new grade, or claim to be addressed by the new title? Certainly not, until he gets his commission or appointment from the President of the United States. The President confers the title in the commission or appointment, and whether it be descriptive of the functions which the officer is expected, nay warranted and commanded to perform, it is the only title which he can claim.

The question of title then is settled by the commission. If an assistant surgeon be a captain, he will be so designated in his commission, and commanded by that instrument to do all manner of things belonging to that grade. But if he is designated in that instrument as an assistant surgeon, and commanded to do all manner of things pertaining to that office, then his title is assistant surgeon, whatever dignity and emolument may be legally conferred on him.

The plaint of Colonel Woodhull that the title "Doctor," by which medical officers are almost universally addressed in military society, "means nothing," is a somewhat startling statement. Why! "Doctor" is supposed to be the highest degree in any of the learned professions, and has been the goal of professional ambition for centuries. But Colonel Woodhull says: "I fancy no one but a very young man takes much pride in this title as a title." And in another place he refers to "the sadly abused doctorate." How has this title of distinction, which has been proudly worn by so many eminent men, become so degraded as to deserve such language from a member of the doctorate? Perhaps Colonel Woodhull could answer the question. The line gives it up.

Admitting, however, that there may be something in this abuse of the doctorate to justify the young men of the profession in despising "the title as a title," surely the older members of the doctorate should be more conservative. It should be remembered that, in this country at least, every title has been abused. Think of the effect of saying "Good bye, Major," in almost any representative assemblage south of Mason and Dixon's line. Why! almost every livery-stable keeper, publican and gambler, in certain districts, is a major; that is, he seems to have the social rank of major, if common consent can be accepted as sufficient credentials. Then the hotel registers of Europe could furnish the names of dozens, aye hundreds, and perhaps thousands of generals, U. S. A., who, in all probability, had no more right to the title than Jack Bunsby had to be called Mikado of Japan. The doctorate has our sympathy. We also have suffered. But we have never seen a proposition to change

military titles on that account. No ; let us stick to our titles ; they are ancient and honorable, and fairly descriptive, and they have been borne by too many distinguished men for us to be ashamed of them. That they are sometimes illegally assumed only proves that they are honorable. The doctorate cannot be disgraced by quacks and charlatans any more than military titles can be by bogus officers. To be addressed as " Doctor " or " Colonel " is an honor or an insult, according as the title is or is not rightfully due.

But the want of descriptiveness in the medical title and the general abuse of the doctorate are not the only reasons which, according to Colonel Woodhull, make the substitution of the military for the medical title desirable. He seems to be particularly aggrieved at the designation " non-combatant " as applied to the medical staff, and appears to think that that objectionable designation would disappear if the military title was generally adopted. In order to justify his objection to the term " non-combatant," he produces an entirely new definition of it which can hardly be called satisfactory. He says " non-combatant seems meant to represent a passive agent," who is " mysteriously protected from all risk " and whose " duty is always discharged at the rear and in complete safety." Now, how this seems to Colonel Woodhull to be the true definition of a non-combatant is not apparent. It certainly is not the generally accepted meaning in military circles. A non-combatant is one who cannot be commanded to storm a breach or lead a forlorn hope. He may be a commissioned officer or an enlisted man ; his functions may expose him to danger in the fore front of battle ; but if he can claim exemption from such duties as those mentioned above, he is a non-combatant. Personal courage, ability and willingness to serve, have nothing to do with it. Duty alone determines the classification. The true test is not, Would you be willing to go ? but, Can you be ordered to go ?

Medical officers, as a rule, need no certificate of personal bravery. But if they did, the substitution of a military for a medical or surgical title would not supply the want. Men acquire military titles, with some exceptions, by processes entirely disconnected with personal courage, and cowards have been admitted to the hierarchy in almost every army. A military title, then, unless it be by brevet, awarded for special acts of gallantry, is the poorest kind of a certificate of courage. The brevet commission, however, is, or ought to be, such a certificate, and medical officers in our Army have reaped a harvest of them, which compare favorably with that of any corps in the Army.

There are some questions connected with brevet commissions awarded to medical officers, which have never been decided, because they never have been raised. A medical officer breveted a colonel in the Army of the United States, is undoubtedly a colonel, and, while brevet commissions were effective, eligible to command under the conditions imposed by the law. His commission as colonel by brevet in the Army, could not be vitiated in any way by the fact that he held a commission in the Medical Department. He sat on courts and boards by virtue of his brevet rank, and we can see no reason why he should be ineligible to command, by assignment of the President, while such assignments were legal.

There is another question in connection with medical rank which has slept ever since the War, but which was the cause of much controversy in former years, namely, the eligibility of chaplains, surgeons and paymasters to sit as members of courts-martial. The question turned upon the meaning of the words " commissioned officer " as applicable to persons eligible to sit as members of courts-martial. General Benét says, in his " Military Law and Courts-Martial " : " In interpreting the words ' commissioned officer,' it has been the custom of service to exclude from that class all surgeons, assistant surgeons and paymasters, and indeed every one who is not clothed

with military rank proper, and having thereby an inherent right to command." The general is writing in relation to the words "commissioned officers" as applicable to persons eligible as members of courts-martial, and clearly states the customs of service before the War. The point upon which the custom rested seems to be that as the medical officer's commission did not confer the right to exercise the full functions of command, it was thereby tainted. In other words, medical officers were not members of the hierarchy of command, and were therefore ineligible to sit as members of courts-martial. The question had been referred to several attorneys general for their opinions, but the customs of service continued undisturbed until the Rebellion. Indeed it was the recognized and ruling custom of service as late as 1865.

But the War being over and the harvest of brevets gathered, many, indeed most medical officers had acquired a new status. Their brevet commissions gave them the right to the military titles therein awarded, and as they had thus become officers of the Army independent of their commissions in the Medical Department, the custom of service which had excluded them so long became inoperative. Medical officers were therefore placed upon the roster and detailed as members of courts-martial by virtue of their brevet rank.

The era of brevet rank continued sufficiently long to accustom the Service to the presence of surgeons and paymasters on courts-martial. Chaplains do not appear to have been admitted to the roster. Perhaps no chaplains were breveted, but if any of them were, and certainly some of them deserved to be, they would have had the same right to sit on courts that surgeons and paymasters had. But brevets were abolished, and everything should have reverted to the *statu quo ante*. The custom of service which excluded certain officers from courts-martial duty had not been abrogated by any law or new decision. It was still of force. But medical officers had gotten upon the roster under cover of their brevet commissions. The eye had become accustomed to their presence, and they continued to be detailed under their commissions as officers of the Medical Department, just as they had been under their brevet commissions. We do not claim that their presence is an evil; we only ask, is it right?

Colonel Woodhull assumes that his contention, "That in military life, the medical officer should be known by his military designation," is distasteful to the line officer. He says, speaking of the contention just quoted: "I know that this is a hard saying at its first expression to the most of the line." And perhaps he is right. But has he ever fairly considered why it is so? The tone in which he speaks of it, for there is tone even in a written page, would lead the laity to suppose that jealousy, or some baser sentiment, was the exciting cause. The bogus colonel certainly would think so. The honest indignation of legitimacy is always thrown away upon the usurper. Still the line would venture to ask, in justification, if it is absolutely certain that the military title is justly and lawfully due? If the line thinks it unwarranted assumption for any officer to claim a title other than that conferred in his commission, are they not justified in their indignation? The whole question, therefore, resolves itself, as already stated, into the simple inquiry, "Is it so nominated in the bond?"

We might very properly close this criticism here, for the keynote of the controversy is dealt with in the last paragraph; but we discover a statement further on which we cannot pass without comment. The colonel says that "under the law the President can make no man a colonel in the Medical Department." Precisely so. And therefore he does not do it. But, under the law, no one but the President can make a man a colonel in anything. Let the *ad captandum* statements answer each other. Colonel Woodhull knows the weak point in his case. He would like to prove that it is the law, and not the President, that confers the military title, and that, in the Army, rank and title are synonymous terms. We think he has failed, although he has suc-

ceeded in obscuring the main issue. The question is not "whether medical officers, after all, have any military functions?" as Colonel Woodhull says it is, but, "Have they, legally, any military title?" And it is wasting words to argue any bogus issue.

That medical officers in recent years have succeeded in surmounting the barriers which so long excluded them from courts-martial proves nothing. We have endeavored to show how all that came to pass. But a seat at table did not save the man who was without the wedding garment. That he was there was no proof that he was rightly there, and it is just so with the medical member of a court-martial.

The attempt to prove that the functions of medical officers at military posts partake, in a degree at least, of the character of command, because they "originate work" which has to be executed by the garrison, needs no comment. Indeed, everything the colonel says on the subject goes to show that the functions of a post surgeon, even in matters of post sanitation, are purely advisory and not commanding, and that his legitimate functions in peace and in war, although very important and their execution attended with great risks and grave responsibilities, are never military.

Captain Gilbert P. Cotton, 1st Artillery.

Two points in the paper by Brevet Lieut.-Col. A. A. Woodhull, M.D., on "The Place of the Medical Department in the Army" (July number), strike the professional military person somewhat peculiarly. "One condition," says Surgeon Woodhull, (p. 561) "that seriously detracts from his official prestige in a military community is the necessity for the medical officer's presence in the discharge of his duty. The panacea for other officers—to issue an order—will not compass the end; and in a society where the junior generally waits upon the senior the obligation to reverse the procedure tends to diminish respect in unreflecting eyes." From what facts or by what course of reasoning he arrives at such a conclusion would be somewhat difficult for the "liner" to understand. It is not known, for instance, that the first sergeant of a company reports the results of a roll-call to a lieutenant at the latter's quarters, or that this officer feels it a loss of prestige to receive the report "in propria persona" on the company parade, however inconvenient it may be at times. Nor does he feel his dignity greatly injured when he inspects the kitchen and interrogates the cook as to the quality of the food. It would be thought a strange perversion of fancy, even "in unthinking minds," that the captain of a company could lower his dignity by visiting his office and listening patiently to complaints, often ill-founded, of ignorant men who imagine they have a grievance, or when he attends personally to many other things not altogether agreeable, but which conduce to the comfort and efficiency of his men. Nor is it known that the commanding officer of a post can solace himself with that "panacea to others—an order." It is usually believed that even he must be "present in the discharge of his duty," though this duty involve waiting on his juniors, as when he inspects the guard-house and prison-rooms and the not altogether pleasant prisoners therein.

Indeed it is generally thought by these "other officers" that to perform duty by proxy—the panacea of an order—would have exactly the contrary effect to that described by Surgeon Woodhull, and if carried too far would be apt to cause something more than passing comment from military superiors.

There is no corps where undue stress laid on the question of rank by its officers can work such detriment, if not cruelty, to those around them as the Medical Corps. Obtaining his promotion with a rapidity out of all relation to that of line officers, the medical officer habitually finds himself ranking the majority of those among whom he serves.

To lay stress on a supposed loss of prestige in professional attention on officers

who, though junior in rank, may easily be senior in years and in service, seems slightly ungracious—if nothing else.

It has happened more than once that a line lieutenant has seen a stripling in short clothes tumbling about his quarters, who, later on, entering the Medical Corps, has beaten the elder in the race to a captaincy.* Shall it be considered "in a society where the junior generally waits upon the senior" that this stripling who is junior to the other in years, in experience, in honorable service, in every attribute that goes to make an officer, and who has won his promotion, not through superior merit, but by a fortuitous circumstance—the survival of conditions that no longer exist—shall it be considered that this one has lost in military prestige or that it "diminishes respect" in reflecting or unreflecting eyes for him to attend at the bedside of that other if necessity demand it? Heaven help those of us who are on the plains and can obtain no other aid, if it does.

If the medical officer desires a military title and the same footing with other officers in this regard, let him earn it as "these others" do—by length of service and "weary waiting"—and no one will begrudge it him. Further down the same page the author states: "But these minor matters would have no value, did they not tend by their conspicuous and more common character to leave an impression upon military society greater than that made by the grave public duties discharged without publicity, and thus to bring the gratuitous family physician and general convenience theory more glaringly to the front."

Paragraph 1634, A. R. states that: "Medical officers, where on duty, shall attend officers and the enlisted men and their families." In the face of so clearly defined a duty, it is difficult to understand how this officer can intimate that there is a theory abroad that he is dispensing a gratuity.

When an officer finds his horizon becoming so filled with the idea of rank and military precedence that other things are dwarfed by comparison, it would seem high time to suggest the panacea of one order—Halt!

* The medical officer enters the Army a first lieutenant with the pay of a mounted officer and obtains his promotion to a captaincy, without examination, after five years' service. Other officers enter as second lieutenants, and in the line wait usually from five to seven years for promotion to first lieutenant, and about fifteen years to a captaincy.

Reviews and Exchanges.

Submarine Mines in Relation to War.*

MAJOR CLARKE is very favorably known to military engineers of this country from his writings on fortification, experimental firings, etc., and anything from his pen at once commands attention. In this paper he appears in what for him is a new field, and if his views do not meet full acceptance on this side of the Atlantic, it is perhaps because the conditions which he discusses are not our conditions. He treats submarine mining from the point of view appropriate to a nation having command of the sea ; we look at these auxiliaries as the best obstruction to channels dependent on land defenses for immunity against hostile fleets more powerful than our own are now, or are likely to be for at least a generation. In discussing his paper critics must beware of the error of the two knights of old, who maintained *à outrance* that the shield was wholly gold or wholly silver when, in truth, they knew only one side.

Major Clarke waives all technical treatment of submarine mines, and considers (1) their fitness for defending harbors of varying classes ; (2) the validity of certain historical claims ; (3) the relation of this branch of defense to others, and (4) the extent to which the system is applicable to British requirements. Only the first three questions concern us.

Under the first head he cites the Chatham text-book of 1873 as going too far, by claiming submarine mines as universally applicable to the defense even of unarmed towns, open beaches and cramped waters commanded by fire. In this American engineers will certainly agree ; with us, cover by land guns forms an essential part of the system, and where that fire cannot be escaped no mines are required.

Under the second head he argues that the advocates of submarine mines hold that the teachings of the American and of the Franco-German wars constitute proof positive of the value of the system, that it is cheap, and that the moral effect is enormous. He takes the position that " the first will not stand any examination whatever, the second depends wholly upon what is understood by a mine defense, the third is a matter of circumstance and opinion."

Here issue may fairly be joined. Major Clarke estimates the destruction in the War of 1861-65 at 21 vessels sunk and 3 more seriously injured. The true figures (omitting, of course, damages by spar and coal torpedoes) are 28 vessels sunk, of which 7 were ironclads ; and 6 vessels seriously injured, of which 1 was an ironclad. Moreover, of these casualties 1 occurred in 1862, 5 in 1863, 12 in 1864, and 16 in the first half of 1865, showing the rapid development of the system, defective as it always was in our estimate of to-day. Had it been as perfect at the outset as it was at the close of the War, and had we been able to push hostilities as vigorously (both of which

* *Submarine Mines in Relation to War.* By Major G. S. Clarke, C. M. G., R. E., Woolwich. Printed at the Royal Artillery Institute. 1890.

are implied in Major Clarke's reasoning), the loss in the four years should fairly be estimated at $16 \times 8 = 128$ vessels. He very truly states that the circumstances of the Confederate States were so different from those of Great Britain that no parallel can be assumed; but from our point of view (possessed of no armored fleets), the record may encourage us to believe that a hostile fleet appearing on our shores would receive a startling welcome.

Touching the ability of fleets to run past modern batteries, without accepting the somewhat radical negative position taken by Major Clarke, we may agree that such an operation would hardly be attempted unless clear water lay ahead; but as most of our chief ports offer this inducement to a dashing enemy we prefer, pending a war trial of position finders, rapid-firing guns of large calibre, etc., to place what we believe would be an effective barrier in the path. Probably Major Clarke would do the same at ports like Melbourne, were he required to prepare to receive a powerful naval attack. We contend that fleets cannot expect to engage modern land batteries successfully on anything like equal terms as to armament; but the running past when the channel is good and the light unfavorable to artillery practice is a different matter, and where the land forces have to depend on their own resources mines are of immense value.

As to the cost of an effective submarine mine defense, a point which the pamphlet before us raises, but hardly discusses, a few words may be pertinent. The Board on Fortifications or other Defenses recommended a liberal use of this obstruction in our 27 chief ports,—covering in all of them broad expanses of water lying under the fire of land guns; and the cost, including mines, operating casemates, electric lights, etc., was only about three and a half per cent. of the whole outlay required. In fact, it was less than half the cost of the torpedo boats added as a measure of precaution. The claim of cheapness can certainly be stoutly maintained.

It is perhaps a delicate matter to discuss the moral effect of the belief that a mined field lies ahead, when the officer is in command of a war-ship that he knows to be important and perhaps essential to the success of the fleet; but it should hardly be dismissed as "a matter of circumstance and opinion." Some men may push on regardless of consequences whether the act upon the whole be judicious or not; but it is believed that the responsibility would weigh heavily upon the majority. As to this matter we may consult history with some confidence. Major Clarke does so freely in treating the question of ships running past modern fortifications, although in the absence of any crucial test the same logic would discredit position finders, rapid-firing guns, and other modern devices; but he scarcely refers to Charleston, which is a case very much in point. No one for a moment will impugn the conduct of our naval officers there, yet it is a fact now established on indisputable evidence that the channel was not blocked with torpedoes prior to the winter of 1864-65, and that the mechanical obstructions were of a very imperfect type. Nevertheless, "the ironclad squadrons of Rear-Admirals Dupont and Dahlgren were as effectively stopped for more than two years by fear of these as by anything else." It has been aptly said that the torpedo "attacks both matter and mind," and its advocates are not likely to yield either claim, while the War record stands and human nature remains unchanged.

There are many ideas in Major Clarke's paper which will command universal assent, and it is well worth the perusal; but so much of his reasoning is inapplicable to a nation like ourselves, possessing little sea power, that it has seemed better to devote the limited space to points of difference rather than to points of agreement.

H. L. A.

The Defense of Charleston Harbor.*

This book will take a distinguished place in the permanent war literature of our great struggle. The volume contains about 450 pages, and appears in a neat dress, well illustrated with maps, views and portraits; and it is a pleasant sign of the times to find among the latter excellent likenesses of Admiral Dupont and of General Gillmore.

The author served as Engineer-in-charge at Fort Sumter during the greater part of the siege, except when absent by reason of wounds, of which he received two at different dates. The scope of the work cannot be better stated than in his own language: "The constant aim has been to write a history which will be deemed worthy of its subject, without either falling into the dryness of the chronicler or lavishing on persons and things the superlatives of the war correspondent. Having preserved all my private notes, sketches, and diary, together with the Engineer's official journal from July 20th to September 2, 1863, and my reports made almost daily to the Chief Engineer, and having also been aided by the authoritative materials for history printed since the War, I have had the satisfaction of writing what is as nearly an official narrative in point of accuracy and fulness of particulars as could be desired." It might be added truthfully that by a skillful adjustment between text and appendices he has presented all the details needed by the student without interrupting the interest of the narrative.

The narrative covers the operations on Morris and James Islands, and others, but naturally interest centres at Fort Sumter, which in history is the wounded lion of the War. What General Gillmore did on Morris Island has long been known; what Admiral Dupont and Admiral Dahlgren did with the armored fleet is all on record; what was occurring in Fort Sumter has remained until now buried in mystery. The world without saw the brick walls crumble and the new ramparts rise, but woe to the assaulting party which sought to investigate within. Since the War silence has shrouded the ruins and their story.

The veil is now raised, and we behold the garrison busy in the labors of preparation and repair, or braving the dangers of three principal and eight minor bombardments, during which 3500 tons of metal were thrown against the fort and 2400 tons struck the mark. Now falling ruins crush a party of men asleep; anon the accidental explosion of a magazine spreads destruction in every direction; frequent casualties, broken rest and weary labors mark the days as they pass. During the great naval attack of April 7, 1863, two shells—a 15-inch and an 11-inch—passed through the weakest part of the scarp and exploded on the parade. How this weakness was corrected before the land guns began their still more destructive work is explained in full. "The fiction of Fort Sumter's being protected by the spontaneous or fortuitous piling of its own debris, has been pointed out and corrected in these pages. Foresight contrived and hard work executed the plans of defense." The skillful manner in which this was accomplished should be known to every engineer and artillery officer, who in the present condition of our sea-coast defenses may at any time be called upon to make practical use of the knowledge.

But this brave garrison was not content to remain quietly at home. After they had sunk the *Keokuk* and she lay four miles away, off the southern extremity of Morris Island, with "the turrets just visible above water at the latter period of the ebb tide," and after reconnoissances by Confederate naval and army officers had decided

* *The Defense of Charleston Harbor, including Fort Sumter and the Adjacent Islands, 1863-1865.* By John Johnson, formerly Major of Engineers in the Service of the Confederate States. Charleston, S. C., Walter Evans and Cogswell Co., Publishers, 1890.

that the recovery of the guns was impossible, the garrison did not allow the matter to rest. A gang of skillful mechanics was organized to work many dark nights in cutting through the massive iron of the turrets and clearing the two 11-inch guns, each weighing 16,000 pounds, from the wreck. "The enterprise was conditioned and limited by the following necessities, viz. : darkness, secrecy, quiet, short time, smooth water, and perpetual vigilance," for "the Union fleet lay outside, and even some of their small boats on picket duty could be descried from the deck of the *Etiwan*." Space is lacking to follow the narrative, but when "the last bag of sand had been transferred and human ingenuity can do no more," when "the first streaking of the eastern sky with the early dawn is discovered," and there came at the last instant to relieve their despair "a friendly wave from the ocean, swelling landward, and lifting the hulk higher than before, lifting the spars and blocks, lifting the muzzle of the gun from its detaining lodgment, and lifting the hearts of all these waiting men from the depths of painful suspense to joy and satisfaction," the reader, whether he wore the blue or the grey, cannot but feel a thrill of genuine sympathy with these gallant American soldiers. By this exploit were procured the two most powerful guns mounted on the defense of Charleston.

The book is by no means a simple narrative of events. It abounds in thoughtful comments upon the various operations; among them is a criticism upon the attacks upon Fort Wagner, including two desperate assaults, a bloody siege, and the loss of about 2400 Union soldiers. It will be remembered that Fort Sumter was effectually silenced by the breaching batteries two weeks before the evacuation of Wagner. Major Johnson considers that: "Two flotillas, one worked every night from Vincent's Creek, and the other from the fleet lying off Morris Island co-operating with it, could have settled the possession of Cumming's Point without the bloody repulses before Wagner, without the long delay of the siege, and with the *éclat* of a captured garrison." The plan was favorably mentioned in the correspondence between the Union commanders, and the wonder is why it was not adopted.

A concluding sentence of the author forms a fitting close to this notice and gives a fair idea of the spirit in which the work is written: "From a due consideration of the many facts which have been summarized under the foregoing heads, it is hoped that all minds will be enabled to form a true estimate of the Confederate defense of Charleston Harbor. After all, the verdict of posterity will be the surest. It may not yet be full time for mature opinion, but already the passions of the combatants have cooled and their judgment of one another is becoming yearly more just and more generous. The North has impressed the South with respect for the National idea—a motive new and strange to the latter, but destined in the providence of God to lead both sections, united in one people, to higher and grander achievements as the years roll on. In that period of national greatness it may happen that due credit will yet be given to the formative and conservative value of Southern principles, as old as the foundation of the Union itself."

H. L. A.

Journal of the U. S. Cavalry Association.*

"Better and better" is the verdict we gladly pass upon the *Journal of the United States Cavalry Association*.

Each number has its own peculiar merit, and each seems to be a trifle of an improvement upon its predecessors.

The discussions carried on in its columns show an increasing and an intelligent

**Journal of the U. S. Cavalry Association*, No. 9, Fort Leavenworth, Kansas.

interest on the part of officers of the mounted service in all that pertains to the military profession at large as well as to the specialties of their own branch of it.

We have always felt that the multifarious duties falling to the lot of the cavalrman on our remote frontier ; to-day, in command of a company ; to-morrow, marching with recruits to be distributed among the posts of a department ; next week, perhaps, in charge of all the administrative bureaux, the adjutant's, the quartermaster's, the commissary's, of his station ; and still later, in charge of Indian scouts following the dangerous trail of hostile Indians, as subtly treacherous and ferocious as so many tigers ; or else on duty at or near agencies, where the most delicate management and most unerring judgment were needed to anticipate trouble, allay suspicions, engender good feeling and prevent outbreaks, could not fail to develop in the men physically capable of graduating in such a training school, the skill, coolness and mental balance essential to the generals of the future.

We are glad to see that this wealth of experience is not to be hoarded by individual possessors, or blindly allowed to go to waste. It is a treasure which cannot soon again be accumulated. The Indian tribes have ceased to be a menace, and may soon cease to exist.

It is well, then, that the task of comparing, sifting out and classifying this wealth of knowledge and experience, a task for which the *Journal of the Cavalry Association* is so well adapted, has been begun in good season and in good earnest, J. B.

Instructions for Courts-Martial and Judge Advocates.*

This thin volume is, to all intents and purposes, a reprint, with some additions, of a dozen predecessors. The additions are mainly to be found under the head of "General Instructions," and are excellent in their way.

In every new issue of this valuable *Vade Mecum*, the chapter containing General Instructions grow visibly larger, until there is danger that the utility of these pocket digests will be whelmed and drowned beneath the flood of superfluous detail. Winthrop's luminous—voluminous—work on military law is scarcely a handy book for the trial of a case. Let no future "Instructions for Courts-Martial" exceed the limits of the sixty pages under review, under the penalty of being classified with that massive work, and neglected in favor of some less pretentious and more flexible rival.

This little compilation by Captain Ray contains all that can be needed for the satisfactory trial of the average court-martial case ; a good deal more than is required for most of them. Though of local authority it is of general application, and will add to the reputation of the compiler as an intelligent and painstaking officer.

H.

History of the Seventh Regiment of N. Y.†

This able work published by the Seventh Regiment, and more particularly intended for circulation among the many friends of this celebrated corps, has a still wider scope in the intrinsic value it possesses for the military reader as a compendium of the growth of the militia of New York State under the various laws which have been enacted for its proper organization and discipline.

Commencing with the Dutch colony of New Amsterdam in the year of 1609 and continued up to the present time, the author presents an exceedingly interesting account, illustrated by excellent wood cuts, of the laws, customs, uniforms and disci-

* *Instructions for Courts-Martial and Judge Advocates.* By Captain P. Henry Ray, Acting Judge Advocate U. S. Army, Omaha, Neb., March 1, 1890.

† *History of the Seventh Regiment of New York.* By Emmons Clark.

pline ; and while the regiment is always in the foreground, yet it stands there from its merits, for the impartial soldierly spirit of the author gives due credit to other organizations.

It is a frequent remark that the military forces of the State at the present time partake too much of a social character to enforce proper discipline, but be that as it may, a retrospective view shows the great advance which has been made in matters of discipline by citizen soldiers.

An example occurring in 1840 will show this, and at the same time, the beneficial influence the regiment was then exerting.

It was at that time proposed to organize a club or association for the purpose of giving the general commanding from time to time, suggestions, hints, or perhaps instruction, as to what *he* should do, and to demand pay for an occasion when not actually ordered out. The officers of the 7th (then the 27th) were invited to co-operate, but declined, coming *to the sensible conclusion not to interfere with the general in giving unasked for advice, and in not demanding pay for services not rendered.* It is such a spirit as this that must have enabled these officers to build the foundations of the splendid organization of the present time.

Not the least interesting reading is the conduct of the regiment during the riots and civil disturbances in which it was called under arms, and while General Clark has displayed a soldierly brevity in all his writing, yet, perhaps, it is to be regretted that he has not given us more particulars of these occasions ; for the treatment of mobs has always been a problem of great interest to all engaged in the profession of arms.

The list of active service is a long one, as is shown in the following :

In 1849 Astor Place or Macready riot.

“ 1857 Metropolitan Police riot.

“ Dead Rabbit riot.

“ Mackerellville riot.

“ 1859 Quarantine “ war.”

“ 1861 U. S. service at Washington.

“ 1861 U. S. Guard duty at East New York, and U. S. Service at Baltimore.

“ 1863 U. S. Service at Baltimore and Fredericktown, draft riot.

“ 1871 Orange riot.

“ 1877 Labor & R. R. riot.

The historian takes proper pride in recording the services of the Seventh when serving under the United States' flag. That the prompt response when called upon to perform military duty, beyond the boundaries of the State, was of great benefit in moments of emergency, is on record at the War Department, independent of this, a most excellent example of promptness was afforded to the other regiments. But the genuine military strength of the organization was most thoroughly tested when there was furnished from its ranks some six hundred officers to the United States and yet it recruited to full ranks again with the same class of young men.

A warm love seemed to have always existed between these cadets from the regiment and their successors ; and to this day the war veterans refer with pride to their “ Military Mother,” while the regimental records give full reverence to the memory of those comrades who fell on the battle-field under the folds of other regimental flags and to the survivors.

This record of soldierly duty, faithfully performed, has endeared the Seventh to the public and presents an example of discipline for other organizations, throughout the United States, to follow. How that discipline has been arrived at by the exertions of a succession of good field and line officers for the past fifty years is here presented for the young officers of this day to read and ponder over. In the words of the Dedi-

cation, "to inspire the young men of New York to imitate the example of those who built the regiment up." The National Guard maxims presented at the close of the work are valuable and suggestive.

That Col. Emmons Clark stands pre-eminent among all the excellent commanding officers of the Seventh regiment is without question, but no one officer nor any succession of commanding officers could have accomplished what has been done, if not supported by efficient line officers; and the services of such line officers were only secured by the wise exercise of the elective privileges by the privates of the Seventh regiment.

Popularity with them has never been permitted to crowd ability to the rear, and if it be possible to extend that judicious use of the ballot throughout the whole National Guard the vexed question of the "election" of officers would be solved and the full military value and strength of the militia would be arrived at. The history of this regiment is, however, before the public, showing that the success obtained did not depend upon the life of any one individual, but the whole was maintained by a judicious system. There is no doubt its ranks are, and have always been filled with gentlemen suitable for officers, who, if they possess the ability, come to the front; like King James' spearmen:

"Each stepping where his comrade stood,
The instant that he fell."

General Clark after thirty-two years' service in which he achieved such splendid results now crowns his labors with an admirable history of the regiment, and perhaps the most concise criticism of the work which can be made will be in liking it to one of the dress parades under his command; working smoothly, its parts complete, exact and orderly in the whole; and full of interest to the observer, be he professional or citizen.

The committee of publication has produced an unique work, the type, illustrations, paper and style are perfect in their way, while too much praise cannot be awarded the author for his admirable system of compilation, careful research and the interesting manner in which he presents his subject to the public.

E. L. M.

New York and Vicinity During the War of 1812-15.*

The antiquary will find in this book a treat prepared, with painstaking accuracy, from ancient records well-nigh unknown to the generation which throngs the streets of the great city to-day. The local changes which have occurred during the past three-quarters of a century seem incredible. The population was then about 98,000 persons, of whom about 1500 were slaves. Of aliens there were about 3000, English, Scotch, French and Irish; Germans were almost unknown. Commerce was the chief occupation. The southern part of the East River front was the chief seat of the foreign trade. Pearl Street was the principal mart. Broadway, below Leonard, and Greenwich Street were favorite localities for residences. Canal Street from the Hudson River to Centre Street was an open sewer, with not a house on its borders, and with only a few scattering buildings to the northward. There were only two bridges crossing the stream, one of stone at Broadway, and the other at Greenwich Street. On the East side, North Street (now Houston) marked the city limits, all beyond being esteemed country.

* *New York City and Vicinity During the War of 1812-15*, being a military, civic and financial local history of that period. By R. S. Guernsey. Vol 1. New York: Charles L. Woodward, bookseller, 1889.

One mail a day, each way, with a schedule time of 36 hours, connected the city with Washington : postage then varying from 8 cents to 25 cents per sheet, according to distance.

The fortifications of New York, very fortunately for the city, had not been neglected. Preliminary surveys and projects were completed in 1794 by Charles Vincent, a French engineer, and these exerted an important influence on the constructions. Lack of funds postponed the work until 1800, when it was commenced with State funds expended under the direction of the general government. In 1805 Colonel Jonathan Williams made a new survey and report to Congress, and work was actively begun in 1807, also with State funds. The fortifications and armament in position at the outbreak of the War were the following : In the city, South West Battery, later called Castle Clinton, and now Castle Garden, built about 1811, 28 guns ; North Battery, off Hubert Street, three blocks below Desbrosses, later called Red Fort, 16 guns ; on Governor's Island, Castle Williams, 78 guns ; Fort Columbus, built in 1807, 60 guns ; on Bedloe's Island, mortar battery and star fort, 24 guns ; on Ellis Island, 14 guns and 4 mortars ; on the Staten Island side of the Narrows, Fort Richmond, Fort Mor-ton, Fort Hudson, and Fort Tompkins, incomplete, 60 guns. Total, 280 guns, mostly 32-pdrs or smaller calibres, and 4 mortars. There was no fort on the Long Island side of the Narrows, except an earth work (20 to 30 guns) near the site of Fort Hamilton ; nor at Sandy Hook, nor at Hell Gate. Other works were begun or completed during the War ; Fort Gansevoort, near foot of the street of that name ; an earth work on the Battery Park, South Battery on Governor's Island, Fort Lafayette, and works on Sandy Hook and Navesink Highlands. Also "a line of torpedoes was anchored at the Narrows ready to be stretched across the channel at short notice, so as to blow up vessels passing by the forts."

Such was the theatre of operations in this vicinity in 1812-15. No attack was made upon the defenses, which thus fulfilled their object in the best possible manner ; but an annoying blockade was maintained for several months. The operations of the garrison at Sandy Hook and the Highlands were confined to boat attacks on small craft and to securing, in defiance of bombardment, the cargoes of vessels driven ashore by the British fleet, exploits both dashing and amusing.

The chronicle before us gives a lifelike picture of the times ; the inspection of the troops (at first about 3500 men), their uniform, target practice at the Battery and at the Narrows ; fitting out privateers, complimentary balls and banquets with their toasts, thirteen in number, corresponding to the number of the original States, at Federalist, and eighteen at Democratic dinners ; complimentary resolutions of the Common Council ; protests against the inadequacy of the defenses, one in company orders by a militia captain condemning the Government "for their weakness and folly in plunging us unprepared into this quixotic war," for which he was tried and acquitted by court-martial, although the finding was disapproved ; the abandonment, not without a struggle, by the Tammany Society of their habit of wearing Indian dress in celebrating the 4th of July, on account of current Indian atrocities in the North-west ; accounts of torpedo and other operations on Long Island Sound ; echoes of events in other parts of the country, and finally the financial and other effects of the War.

Mr. Guernsey has succeeded in presenting a series of quaint pictures of our National infancy ; and the reader will rise from the perusal with an appreciation of the research and time devoted to what with him has plainly been a labor of love.

H. L. A.

Reloading Implements.

Referring to the advertisement of the Ideal Manufacturing Co., New Haven, Conn., we may say that while it is very convenient to obtain loaded cartridges it is also desirable for many reasons to load and reload our own at home. It is also much more economical, if one has time and inclination to do so. The "Ideal" Manufacturing Co., of New Haven, Conn., makes an excellent outfit for reloading. The making of good bullets is to many a difficult task, but it is very simple and easy if one has good tools to work with. First, an "ideal" dipper is required; next, a larger vessel for containing the lead. The dipper is used only for pouring the metal. It gives it "head," or pressure, and forces out the air, and fills up the mould completely, if the mould is kept at the right temperature.

FOR REVIEW.

Grant versus The Record. By Col. Carswell McClellan. Houghton, Mifflin & Co., 1890.

Practical Information for Non-Commissioned Officers on Field Duty. By Brevet Lieut.-Col. Guy V. Henry, U. S. Army.

Submarine Mines in Relation to War. By Major G. S. Clarke, C. M. G., R. E., 1890.

The Defense of Charleston Harbor, including Fort Sumter and the Adjacent Islands, 1863. By John Johnson, formerly Major of Engineers in the service of the Confederate States. Charleston, S. C. Walker, Evans & Cogswell Co., 1890.

Recollections of General Grant, with an Account of the Presentation of the Portraits of Generals Grant, Sherman and Sheridan at the U. S. Military Academy, West Point. By George W. Childs. Philadelphia, 1890.

A Catechism on Cavalry Outposts, Reconnoissance, Patrols, and Advance and Rear Guards. By E. A. Garlington, 1st Lieutenant, 7th U. S. Cavalry.

New York City and Vicinity during the War of 1812-15. By R. S. Guernsey. Vol. I. New York, 1889.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Boletin del Centro Naval (March, April).

BELGIUM.

La Belgique Militaire. Study on Our Cavalry. A Visit to the School of Ypres. 75th Anniversary of the Battle of Waterloo. Cupolas on the Meuse. Military Examinations. Mounted Captains in Infantry.

Revue Militaire Belge (To date).

ENGLAND.

Proceedings of the Royal Artillery Institution. (June, 1890.) Submarine Mines in Relation to War. Odd and Scarce Books on the Military Art. The Mexican Army. Ancient Portuguese Ordnance. (July) Fire Control in Fortresses. Instruction of Army Signallers in Observing and Reporting Ships.

Publications of the Aldershot Military Society. Fundamental Principles of Cavalry Drill.

The Illustrated Naval and Military Magazine. (June, 1890.) Epochs of the British Army.—VI. Great Commanders of Modern Times. Napoleon. Naval Warfare. XII. The Russians in Hungary, 1849. On Increasing the Fighting Power in Ships of War.

Army and Navy Gazette (To date).

United Service Gazette (To date).

FRANCE.

Revue Militaire de L'Étranger. Modifications Proposed in the Artillery Organization of Austria-Hungary. The Organization of the Higher Commands in the Russian Field Army. The Persian Army. Military Schools in Russia. The Artillery Combat in Siege Warfare.

Revue du Cercle Militaire. The Mobilization of the Fleet and the English Naval Manœuvres. The Foot Manœuvres of the Russian Dragoons. Mountain Artillery. The English Torpedo (Brennan).

Le Progrès Militaire (to date).

INDIA.

Journal of the United Service Institution of India, Vol. 19, No. 80. Recent Ideas on Fortifications. The Company as the Tactical Unit of the Future. The Effect on Cavalry of Recent Improvements in Fire-arms. Training of Russian Company Officers in Central Asia.

ITALY.

Revista di Artiglieria e Genio (May and June, 1890).

NEW SOUTH WALES.

United Service Institution of New South Wales. The Defense of a Protected Harbor. Harbor Defense by Guard-boats and their Duties. Round about Apia, Samoa.

SPAIN.

Memorial de Artilleria (May and June, 1890).

UNITED STATES.

The North American Review. (July, 1890) The Emancipation of the Family. Summing up the Tariff Discussion. The Prince of Wales. Railway Men in Politics. (August) Our Army and Militia. Recent Progress in Theosophy. American Influence in China. In Westminster Abbey. The Capture of Canada.

The Popular Science Monthly. (July, 1890) Greenland and the Greenlanders. The Musical Sense in Animals and Men. Human Heredity. Commercial Geography of South America. (August) Missions and Mission Indians of California. Common Sense applied to the Tariff Question. Sanitary Work in Great Disasters.

St. Nicholas. (July, 1890) The Baby a Prisoner of War. The Armorer's Errand. Six Years in the Wilds of Central Africa. (August) A Lesson of the Sea. A Remarkable Boat Race. Six Years in the Wilds of Central Africa.

Harper's New Monthly Magazine. (July, 1890) Some Colonial and Revolutionary Letters. Texan Types and Contrasts. Treasury Notes and Notes on the Treasury. Baltic Russia.

The Century. (July, 1890) The Autobiography of Joseph Jefferson. Nathaniel Boem, the Patriot of 1676. A Yankee in Andersonville. The Inside Facts of Lincoln's Nomination. Bloodhounds and Slaves. (August) The Perils and

Romance of Whaling. The Autobiography of Joseph Jefferson. An Artist's Letters from Japan. A Yankee in Andersonville. The New School of Explorers.

Magazine of American History. (July, 1890) The Golden Age of Colonial New York. Burgoyne's Defeat and Surrender. President Lincoln's Humor. Our Relations to the Past a Debt to the Future. (August) The true Story of an Appointment. Major-General Ebenezer Stevens. The French Canadian Peasantry. Pleasure Parties in the Northwest.

The United Service. (July, 1890) History of the Mormon Rebellion of 1856-57. The Battle Tactics of To-day. Captain Morgan's Choice. Frederick the Great. National Guard Camps. The Trials of Staff Officers. (August) The United Cavalry, Past and Present. The Instruction of the Infantry Soldier. Napoleon.—Part I. The Chinese Army. History of the Mormon Rebellion of 1856-57. The Trials of Staff Officers.

Political Science Quarterly. (June, 1890) National Sovereignty. The Comptrollers and the Courts. On Census Methods.

Bulletin of the American Geographical Society. (June, 1890) The Roman Wall in Britain. From Corea to Quelpaert. Volcanic Eruption in the Behring Sea.

The Pacific National Guardsman. (June, 1890) History of California Volunteers during the Civil War. A Russian Officer's Ride to the Exposition. The Three Hundred. A Close Call.

The Pennsylvania Magazine of History and Biography. (July, 1890.) Itinerary of General Washington, from July 15, 1775, to December 23, 1783. The Leaders of the Old Bar of Philadelphia. Autograph Collection of Ferdinand J. Dreer.

Journal of the U. S. Cavalry Association. (June, 1890) The Story of a March. The Riding School and Its Importance in the Training of Cavalry. American Practice and Foreign Theory.

The Railroad and Engineering Journal. (July, 1890) The Latest English Cruiser. The Development of Armor. The Hudson River Tunnel. The Engines of the Maine. United States Naval Progress. Interoceanic Communication by way of the American Isthmus. (August) A Proposed Ship Canal. A French Armored Cruiser. An Indian Engineer's Predicament. United States Naval Progress.

Monthly Weather Review (To date).

Publications of the Department of Agriculture (To date).

Science (To date).

The Army and Navy Register (To date).

Johns Hopkins University Publications (To date).

Philadelphia Weekly Times (To date).

The Boston Courier (To date).

Home and Country (To date).

Kansas City Times (To date).

Somerville Journal (To date).

Table Talk (To date).

The Electrical World (To date).

The Critic (To date).

Announcement.

I.

Prize Essay for 1889.

THE competition for the Gold Medal of the Military Service Institution closes October 1, 1890. Subject of the Essay "A PRACTICAL SCHEME FOR TRAINING THE REGULAR ARMY IN FIELD DUTIES FOR WAR."

II.

Assistant Secretary.

AT a stated meeting of the Executive Council held July 11, 1890, Major WILLIAM L. HASKIN, First Artillery, was unanimously elected Assistant Secretary, Military Service Institution, *vice* Lieutenant BUSH who has relinquished that office.

Historical Sketches
of the
Army
of the
United States.

Extract from the Minutes of a Meeting of the Publication Committee held July 18, 1890.

* * * *

Resolved, That the work of supervising the production, editing and arranging for serial publication of material for the "Historical Sketches of the Army of the U. S." (begun in No. 45 of this JOURNAL) shall be entrusted to a Special Committee of two members of the Institution to be designated by the Chairman of the Publication Committee; said special committee to be governed by the provisions of the Circular of November 10, 1889, to Commanding Officers covering the aggregate number of words for the entire work, and to report progress from time to time.

* * * *

The Chair announces the following "Special Committee on Historical Sketches":

Gen. THEO. F. RODENBOUGH, U. S. Army,
Major WILLIAM L. HASKIN, First Artillery.

* * * *

(Signed)

HENRY L. ABBOT,
Chairman.

[Communications intended for the Committee on Historical Sketches may be addressed: "*The Secretary M. S. I., Governor's Island, N. Y. H.*"]

FOURTH REGIMENT OF ARTILLERY.

BY FIRST LIEUT. ALEXANDER B. DYER.

FOURTH ARTILLERY.

IN obedience to the resolution of the House of Representatives, May 11, 1820, Mr. Calhoun, then Secretary of War, submitted to the House on the 12th of the following December a plan for the reorganization and reduction of the Army. Since the reorganization of the artillery, in 1814, this arm of the Service had consisted of a regiment of light artillery and the corps of artillery.

The views of Mr. Calhoun, in so far as they related to the artillery, were adopted by Congress; and in accordance with the act of March 2, 1821, the first four regiments now in service were organized from the regiment of light artillery, the corps of artillery, and the ordnance. Each regiment was to consist of one colonel, one lieutenant-colonel, one major, one adjutant, one supernumerary captain to perform ordnance duty, one sergeant-major, one quartermaster-sergeant, and nine companies; and each company was to consist of one captain, two first lieutenants, two second lieutenants, and fifty-five enlisted men. One company was to be equipped as light artillery; and A company was designated as the light company for many years, but continued on foot to the contrary notwithstanding. The general order of May 17, 1821, from the adjutant and inspector-general's office contains the names of the officers of the 4th Artillery, their assignment to companies, and their stations.

John R. Fenwick, lieutenant-colonel of the regiment of light artillery, was made colonel of the "Fourth," with headquarters at Pensacola; and the companies were assigned to the stations on the Florida and Gulf coasts, extending from Saint Augustine to New Orleans. The following table indicates the organizations from which the companies of the regiment were taken:

<i>Companies and Captains Fourth U. S. Artillery.</i>	<i>Old Organization.</i>	<i>Captains of old Organizations.</i>
A. (BELL'S)	Co. K, Light Artillery.	BELL.
B. (HUMPHREY'S)	Co. C, 3d B., S. D.*	HUMPHREY.
C. (BURD'S)	Co. D, 4th B., S. D. (and part of L).	FANNING.
D. (PIERCE'S)	Co. G, 3d B., S. D.	ROOT.
E. (PAYNE'S)	Co. M, 1st B., S. D.	PAYNE.
F.† (HAYDEN'S)	Co. A, 3d B., S. D.	SANDS.
G. (HOBART'S)	Co. E, Light Artillery.	HOBART.
H. (IRVING'S)	Co. I, 1st B., S. D. (and part of E).	MASON.
I. (SANDS)	Co. M, 4th B., S. D.	BIDDLE.

*B., S. D. in the table stands for "Battalion, Southern Division."

†Organized by Alexander Hamilton in 1776.

It will be seen from this table that the companies were then serving in the South with the exception of A and G ; which were sent South from Boston. Some of the lieutenants were afterwards exchanged to other regiments, so that the student of the personnel of the Fourth Artillery will have to consult the War Department order of August 16, 1821.

Under the order of the War Department, dated April 15, 1824, establishing the Artillery Corps of Instruction at Fortress Monroe, Colonel Fenwick was ordered to that post in command of the new school, with Lieutenant-Colonel Eustis of the 4th Artillery as the second in command. Companies C, D and I were selected from the regiment as its quota to the Corps of Instruction.

In April, 1826, regimental headquarters returned to the South, Lieutenant-Colonel Eustis being left in command at Fortress Monroe. Two of the companies of the regiment were changed at the same time. Soon after its organization the regiment suffered severely from the ravages of yellow fever, and the records for several years indicate great mortality. The southern stations were regarded as unhealthy, and in 1827 General Jacob Brown ordered a general transfer of regiments "as the commencement of a system promising to the artillery generally the advantage of a biennial exchange, and the garrisons of the sickly stations in particular (on the southern frontier) the hope of periodical relief."

The headquarters of the regiment were ordered to Fort Columbus, with the companies distributed to stations at Forts McHenry, Delaware, Columbus, Monroe, and at West Point. The total expense for moving all the regiments was \$15,680, an outlay that must have astonished Congress, as the House called for the reasons for such an expenditure. In his letter of reply General Brown says: * * * "It will be only necessary to state the fact that one of our regiments, lately relieved from the Gulf Frontier, has constantly furnished garrisons for the dreary and sickly posts in that quarter since the organization of the Army in 1821. The number of deaths among the officers of that regiment within this period, six years, has amounted to sixteen, being four times greater than the average number in all the other regiments of artillery."

He should have added that the regiment lost two hundred and twenty enlisted men by death during that tour.

During the next few years there were changes of station between companies of the regiment, and at the opening of the year 1829, regimental headquarters were transferred to Philadelphia.

This was the beginning of the practice of separating the headquarters from the companies, and was continued, at times, for many years. The Black Hawk War, in 1832, necessitating the concentration of more troops in the West, in June of that year Brevet-Major Payne (captain of E company) was ordered to proceed to Chicago with E, F and H companies of the regiment ; and at the same time five companies from Fortress Monroe were ordered West. This battalion included C and G companies of the regiment, and was under the command of Major Crane, of the 4th Artillery. Lieut.-Colonel Eustis, 4th Artillery, commanding Fortress Monroe, was ordered to the frontier to take command of all the artillery.

These troops formed part of Scott's forces ; and instead of arriving in time to fight the Indians, they were, while *en route*, assailed by a more dreadful foe ; for on the passage up the lakes the cholera broke out among them.

After terrible sufferings the depleted battalions arrived at Chicago in August, and finally reached Rock River ; but too late for active hostilities.

The artillery troops returned to their stations that fall, excepting companies E and H, which remained at Fort Gratiot until May, 1834, when E took station at Fort Trumbull and H at Fort Hamilton.

The political aspect of affairs in South Carolina demanded the attention of the Government, and some troops were sent to that section ; companies B, C and G taking station at Fort Moultrie for a few months in 1832-33.

Regimental bands had been merely existing ; but in 1832 the regiments of artillery were given "a sergeant to act as master of the band, and one corporal or private in addition to the ten men" allowed to act as musicians.

In the winter of 1833-34, companies A, B and C were part of the forces under Colonel Twiggs, in Alabama. The necessity for troops having passed, they returned to Fortress Monroe in March. Regimental headquarters moved temporarily to Fort Hamilton, but in November, 1835, were established at Fort McHenry. The annual return of the regiment for that year contains the following pertinent remark : "It is the opinion of the colonel that were the regiment concentrated under the command of its own officers, its discipline as well as its instruction might be improved and the number of desertions might be diminished, and a higher spirit of pride and emulation created."

The Seminole War in Florida, began in the fall of 1835, and that winter and spring the Creek Indians, in Georgia and Alabama, also gave trouble ; so that in May, 1836, seven companies of the regiment were ordered to Fort Mitchell, Alabama.

Companies B, D, E, F, G, H and I, reached Fort Mitchell in June, and General Fenwick was ordered to command all the troops concentrated there ; but being in poor health he soon after returned to Fort McHenry. During that summer the companies were constantly engaged in marching through the swamps on service against the Indians : and when no longer required in the Creek Country, were transferred to Florida. Companies A and C had been sent to Florida the preceding July, so that the entire regiment was concentrated in the Seminole Country that fall.

Company C, under Lieutenant Pickell, was, August 21, 1836, in the fight at Fort Drane, where it had four men severely wounded. The same company, and part of A, were with Governor Call, October 13, 1836, when he was opposed by the Indians in attempting to cross the Withlachoochee River, and Companies A, C, D, E, F, G and H, were with his second expedition and participated in the battle of Wahoo Swamp, November 21, 1836, where one sergeant of H Company was killed. General Jesup relieved Governor Call and opened his campaign in January, 1837, with Companies B, C, D, E, F, G, H and I, forming part of his command. E Company, under Lieutenant Brent, was engaged at A-ha-pop-ka Lake, January 23d, and

again at Hatchee-Lustee, four days later, as were other companies of Henderson's Brigade, Company I losing one man killed.

Lieutenant-Colonel Fanning and Lieutenant Thomas were engaged in the defense of Fort Mellen, February 8, 1837.

The war seemed over in the spring and the regiment was ordered to New York harbor, excepting D and I Companies, which were to take station at Fort Mifflin. But the flight of the Indians under Osceola, in June, renewed hostilities, and many months elapsed before the regiment left Florida. That summer, B Company was mounted and did duty as light artillery during active operations. A, B, D and H Companies were in Taylor's fight at Lake Okecho-bee, in December, 1837, when the Indians were routed, and B, D and H Companies were in the fight at Locha-hat-chee, January 24, 1838.

Companies D and G were part of Bankhead's forces when he made an expedition into the "Everglades," in March, and fought so successfully the band of Arpieka. Company I under Lieutenant Soley, was engaged at Tuscawilla Pond, April 29, 1838, losing one private killed. At the close of the campaign, the regiment was ordered to the Cherokee Country, western North Carolina, and after assisting in the removal of the Cherokee Indians came north to Fort Columbus, New York. Its period of rest was short, for in September it was ordered back to Florida for service. The act of July 5, 1838, added K Company to the regiment. It was organized at Governor's Island, July 24th, and went to Florida in October. The same act cut off one second lieutenant from each company, but more than compensated therefor by the addition of sixteen privates.

The regiment remained in Florida until April, 1839, and was constantly engaged in scouting and in building roads and forts. The only action we find reported was the successful defense of Fort Maitland, in May, 1839, by a detachment of ten men under the command of Lance Sergeant Thomas Baldwin, a corporal of D Company.

May 27, 1839, the entire regiment was at Fort Columbus, and was sent from there to the Grand Camp of Instruction held at Trenton that summer, at which B Company was mounted as a light battery September 27th, receiving its horses from the Dragoons. On the breaking up of the encampment, the regiment was ordered to the Lake Frontier and the headquarters and seven companies took station at Detroit, A and K at Fort Gratiot, and G, at Cleveland, Ohio. H Company was subsequently sent to Fort Mackinac. During the summer of 1840, Companies C, F and I, under Captain Galt, and a detachment of Light Company B, acting as cavalry, under Lieutenant Soley, were engaged in guarding the emigrants passing through the Indian Country, and collecting the Pottawattomie Indians for emigration. The companies exchanged stations at different times, and in August, 1841, regimental headquarters were removed to Buffalo, N. Y., with companies as far east as Madison Barracks. March 19, 1842, General Fenwick, who had been in bad health for a long time, died at Marseilles, France, and John De B. Walbach, then seventy-eight years of age, became colonel of the regiment. In May, the regiment was ordered from the northern frontier to the seaboard. Headquarters and all the companies, excepting B, arrived at

Fort Columbus in June and July, only to be again transferred, for the order had already been issued for headquarters and six companies to take station at Fortress Monroe, with two companies at Fort Washington, one at Fort McHenry, and one at Fort Severn. Some change in the order must have been made, for eight companies went to Fortress Monroe and none to Fort Washington.

The "light companies" of the Third and Fourth Artillery regiments were to garrison Fort McHenry. The Act of August 23, 1842, reduced the strength of each company by seventeen men, so that in order to keep the light batteries efficient they were reduced to four guns; and under orders 17, of 1844, two companies of each regiment were to be associated together for instruction in light artillery. Light Company B was then at Carlisle, Penn., and Company K was sent there to join it in November, and they remained together until the following September.

Space will not permit us to give more than a brief sketch of what the regiment did in the Mexican War. In the fall of 1845 Lieutenant-Colonel M. M. Payne, 4th Artillery, and companies D, G, E and I, of the regiment, were sent to join the "Army of Occupation" at Corpus Christi. G Company took from Fortress Monroe the matériel for a light battery, and the other companies were armed with flint-lock muskets; but expected to have the new percussion muskets sent to them in Texas. Lieutenant-Colonel Payne was appointed inspector-general of the army of occupation, G Company was relieved of the field guns, and all four companies were assigned to Child's artillery battalion. In the battles of Palo Alto and Resaca de la Palma, May 8th and 9th, 1846, the companies above mentioned did their share of the work, Lieutenant-Colonel Payne being wounded and eight enlisted men killed and wounded. Major Gardner, with F and H companies, joined Taylor's army in July; and in September Light Company B arrived at San Antonio and joined Wool's forces. E company was broken up in July, and A and K companies left Fortress Monroe in October for the seat of war.

During the year, A, D, F, G, H, I and K companies were armed with the percussion musket, "which have so far proved a very efficient weapon, far superior to the flint," says the report of the regimental commander for the year 1846. When Taylor moved from Camargo and from there on Monterey, D, G, H and I companies, with Harvey Brown acting major of the battalion, formed part of Child's battalion of the first brigade, second division, F company having been left at Fort Polk.

Early on the morning of September 21, 1846, the battalion of the 4th Artillery was engaged near Monterey, and at noon of that day G and H companies were selected as part of the command to storm the batteries on Federacion Hill. Early the next morning G and I companies were part of the storming party to carry the works that crowned the Independencia Hill (which was finally accomplished with the bayonet) and afterwards the Bishop's palace. Worth's columns of attack on the morning of the 23d contained the four companies of the 4th Artillery, and they bore off full honors in the fighting that ensued before the capitulation of the city, with a loss of twelve men killed and wounded. First Sergeant Hazzard of I

company was one of the nine soldiers mentioned in the official dispatches as having been highly distinguished. We now turn to Light Company B at the battle of Buena Vista, in February, 1847. It had, besides its four 6-pdr. guns and two 12-pdr. howitzers, two 4-pounder Mexican guns that had been added after its arrival at San Antonio, and its personnel was increased by volunteers from the 1st and 2d Illinois regiments. In this battle, B company greatly distinguished itself; Captain Washington, with part of the battery, protecting the right flank of the army, while Lieutenant O'Brien, with the remaining guns, covered himself with glory on the plain. On the 22d O'Brien was so hard pressed that, for lack of horses and cannoners, he was forced to abandon one of the 4-pounders; and the following day, though wounded himself, and all his cannoners excepting a few, disabled or killed, this gallant officer fought his guns *à l'outrance*, winning the highest praise from his foe,* who was held in check by those guns, that were "lost without dishonor," until the batteries of Sherman and Bragg came up, and Bragg "saved the day." B battery may well feel proud of its work at Buena Vista, for it is unexcelled. It lost two officers and twenty-four men in killed and wounded.

When General Scott began his campaign that culminated in the capture of the City of Mexico, regimental headquarters, Major J. L. Gardner, commanding, with companies A, D, F, G and H belonged to Twigg's division of his army. Company K was left in garrison at Carmago and I at Fort Polk. The Fourth Artillery participated in the various duties of artillery and infantry in the trenches and on picket at the siege of Vera Cruz. Then moving with Riley's brigade of the division it was engaged at Cerro Gordo April 17th and 18th, 1847, entered Jalapa two days later, and was there joined by E company the following week. In May they all went to Puebla and were there joined by C company. This company left Vera Cruz as light artillery, but was immediately dismounted on reaching Perote, and joined the battalion of the regiment. G company was designated in general orders of July 16th, as the additional light battery of the regiment, but was not mounted until after the battle of Contreras.

In the battle of Contreras, August 19th and 20th, Riley's brigade, with the Fourth Artillery leading, pushed into the village of San Geronimo on the 19th, and when the next morning the storming columns were formed to attack Valencia's troops at Contreras, the column on the right consisted of the Fourth Artillery and part of the Second Infantry, the Fourth Artillery being in front in double column. As the victorious troops were pushing forward, the color sergeant of the regiment (Sergeant Goodwin) was killed, and gallant Lieut. Calvin Benjamin, seizing the colors of the Fourth Artillery, bore them the first into the works. G was the first company to enter, and "recovered with glory" the very guns that O'Brien had fought and lost at Buena Vista.

After the battle the regiment collected around the guns with the greatest feeling of pride and exultation, and received the hearty congratulations of its companions in arms. General Scott, arriving, joined in the cheers, congratulated the regiment on having recaptured the guns that "were lost

* See letter of General Ferres to Don P. Barrasmonda.

by it on the field of Buena Vista without dishonor and recovered with glory," and also promised that, with an appropriate inscription to its honor, they should be given to the regiment in perpetual token of its achievement. Alas! they now rest in the niches of the Administration Building at the Military Academy. "Remember this, and show yourselves men: bring it again to mind, O ye transgressors."

These guns were at once given to Drum, and they formed part of the armament of his company, which was regularly mounted that day. The regiment lost in the battle one officer and thirty-seven men killed and wounded.

At Molino del Rey, September 8th, Battery G did tremendous work. The other companies of the regiment were with the threatening force in front of the south side of the city, and on the morning of September 12th were in the demonstration against the Garita de Candelaria; and on the afternoon of the following day were detached for the purpose of making a diversion on the Piedad Causeway. Battery G was engaged at the storming of Chapultepec, September 12th; and when volunteers were called for that afternoon to storm the heights the Fourth Artillery soon made up its quota (consisting of Lieuts. D. H. Hill and G. A. DeRussy and twenty-seven men from C, E, F and H companies), which formed part of Casey's storming party the following day, while Battery G worked hard at covering the movement by its fire. After that G Battery fought along the Belen Causeway up to the very gate of the city, losing so many men that additional cannoneers were twice furnished by the South Carolina Regiment. Capt. Simon H. Drum, Lieut. Calvin Benjamin and four men killed, and Lieut. FitzJohn Porter and twenty men wounded, attest the hot position of the battery in that fight; and General Quitman truly says in his report: "The losses sustained by Captain Drum's heroic little band of artillerists from the Fourth Artillery evince their exposure during the day. I do them, officers and men, but justice when I add that no encomium upon their conduct and skill would be misplaced."

The storming party of the regiment at Chapultepec had not gotten off without loss, six men having been wounded. The following day the regiment entered the city. On the very night the gates of the City of Mexico were opened the siege of Puebla (where we left A Company) began, and continued for thirty-two days, A Company being actively engaged at various times during the siege.

The Act of February 11, 1847, gave the regiment another major and a regimental quartermaster; while that of March 3d added L and M Companies. M Company was organized at Fortress Monroe, July 28th, and L Company at Fort Columbus, N. Y. H., November 12, 1847. Both of these companies joined the regiment in Mexico the following December.

In the war with Mexico the regiment lost two officers killed and four wounded, and one hundred and twenty-four enlisted men killed and wounded.

When the regiment left Mexico for Fortress Monroe, in the summer of 1848, Light Battery B and Company K were ordered to remain on the line of the Rio Grande. G Company turned in its horses at New Orleans, but

took its guns to Fortress Monroe, where it was regularly dismounted in accordance with the Circular of September 30, 1848, A. G. O. Under the Act of July 14, 1848, the companies were reduced to forty-two enlisted men. In October the regiment was ordered to Florida, and headquarters were established at Fort Pickens, but moved to Pensacola in the following spring.

General Orders 22 of 1849 mounted an additional battery in each regiment. G, of the Fourth, having been designated for that duty, was sent from Fort Pickens to Jefferson Barracks; and after being there mounted proceeded to Leavenworth and engaged in field duty. It did not remain mounted very long, for in March, 1851, all the light batteries were dismounted excepting Taylor's of the First, and Bragg's of the Third Artillery. While in Florida the companies were kept constantly at work moving through the country. The orders of October 8, 1850, sent the regiment North with headquarters at Fort Columbus, the companies being distributed to that post and Forts Lafayette, Hamilton, Mifflin and Washington. A, C, H and M Companies did not remain long at their new stations, for in June, 1851, they were sent to the coasts of North and South Carolina, only to be sent North again the following June, when headquarters were ordered to Fort Hamilton and a number of the companies to stations on the Lakes, as far as Fort Mackinac.

In 1853 some of the companies again changed station, C and I Companies going to Fort Independence, Massachusetts, while D and M, less fortunate, were sent to the Rio Grande. General Walbach established regimental headquarters at Baltimore, October 1, 1853, the regimental quartermaster and band remaining at Fort Hamilton. In May, 1855, G Battery was ordered to prepare for the field as a mountain-howitzer battery, and was so exercised on two occasions; but after firing a few rounds of ammunition at practice, the matériel was so much injured by the cracking of axles, etc., that the scheme had to be abandoned. The battery subsequently joined in the Sioux expedition, mounted on the battery horses and armed with long range rifles, and September 3, 1855, was engaged under Captain Howe in the battle of Blue Water against the Brulé Indians, being the only one of the four mounted companies that attacked the enemy on the heights on foot, losing two men in the fight but killing and capturing a number of the Indians. October 10th, it encountered a band of Indians and captured five, and subsequently took station at Fort Laramie.

The first part of the following year it operated as cavalry under Cooke, but in August it proceeded to Fort Leavenworth, resumed its guns and participated in the Kansas troubles. It was dismounted under G. O. 9 of 1856, which permitted only one battery to each regiment, and was sent to Fortress Monroe in December to form part of the artillery school.

In the fall of 1856, the regiment was again sent to Florida, the field and staff arriving at Fort Brooke, December 13th. All the companies, excepting B and G were that winter in Florida, having been drawn from Fort Mackinac on the north and Fort Brown on the south, "in order to carry on a vigorous campaign against the Seminoles, who have within the year given evidences of their hostility."

Light Battery B had already been sent from Texas to Jefferson Bar-

racks, and in March, 1857 joined at Fort Leavenworth to form part of Harney's Utah expedition. It there received the horses of G Company, recently dismounted, its own having been turned in at New Orleans.

The regiment was very actively engaged in hunting Indians while in Florida, and suffered great hardships in some of its expeditions through the swamps. The only casualty reported was the wounding of Pvt. King of M Company, in an engagement at Big Cypress. March 13, 1857.

General Walbach died June 10, 1857, at the advanced age of ninety-three years, and Francis S. Belton was made colonel of the regiment. The operations in Florida were prosecuted with good promise of a successful termination of the campaign, but the War Department concluding that its services were needed in Kansas, all the regiment was sent to that Territory in the fall of the year 1857, and soon after distributed through Utah and Nebraska. The field staff and band and Companies A and I took station at Fort Laramie, in August, 1858; Company C and Light Battery B went to Salt Lake, D and E to Platte Ridge, F, H and K to Fort Kearney, and L and M to Cheyenne Pass.

The following summer headquarters and companies E, H, I, L and M were sent to Fort Randall, Dakota, A, to Salt Lake, and F and K to Fort Ridgely, Minn. The privates of D Company were transferred to other companies of the regiment, and the officers and non-commissioned officers proceeded to Fortress Monroe, where the company was reorganized and took station. During the trouble at Harper's Ferry, in the fall of 1859, G and part of D Company were sent to that place and remained there several weeks in November. In 1860, the companies in Utah were kept busy protecting the parties of emigrants going West, and keeping open the mail routes. Light Battery B, operating as cavalry, marched during that summer 2000 miles over a barren and desert country, and though the Indians were continually hostile, the roads were kept open. The battery had a successful fight against 200 Indians at Eagan's Canyon, August, 11, 1860, losing three men wounded (one mortally). August 10th, Sergeant Bishop, commanding a small detachment of the battery, was attacked and forced to withdraw to Deep Creek, where in a fight with a party of Indians, September 6th, he was wounded. All the companies on the plains were kept busy scouting that summer. L Company was sent from Fort Randall to Fortress Monroe that year, exchanging with Company G.

In the War of the Rebellion the active service of the batteries (the term by which we shall hereafter designate the units of the regiment) was so continuous and they were so separated that it is simply impossible, in a short magazine article, to attempt more than a general indication of the work performed by them. The outbreak of the War soon brought the regiment in from the plains. Regimental headquarters took station at Fort McHenry, but were subsequently sent to Fort Washington. Colonel Belton was retired August 28, 1861, and Charles S. Merchant became colonel of the regiment. He was retired August 1, 1863, and Horace Brooks was made colonel.

We will now give, in alphabetical order, the services of the batteries during the War.

BATTERY A.—Batteries A and C were united at Washington, D. C., in October, 1861, made a light battery (4 10-pdr. Parrotts) and attached to Sumner's Division in December. In March, 1862, its armament was changed to 6 12-pdr. guns, and it was assigned to Richardson's Division of the Second Corps.

It was first engaged with the enemy at Rappahannock Station April 28, 1862, being with Howard's Brigade; and in the ensuing campaign against Richmond it did its full share of hard work. It fought well at Fair Oaks June 1st; and, forming part of the rear guard of the Army, was heavily engaged at Allen's Farm and Savage Station June 29th, and at White Oak Swamp June 30th (Capt. G. W. Hazzard of C being mortally, and Lieut. A. Morris slightly wounded), and was in reserve at Malvern Hill the following day.

With Sumner on the right flank of the Army at Antietam it fought desperately, and in the language of its corps commander, rendered "distinguished service." It was next engaged at Charlestown, W. Va., October 16, 1862. Two days later the batteries (A-C) were separated at Harper's Ferry.

A Battery obtained seventy men from the 4th Ohio, proceeded to Washington to refit, obtained 6 3-in. rifles, and rejoined the Second Corps.

It was near the right of Hays' Division of Artillery when Fredericksburg was bombarded, and afterwards crossed the river and was in the fight of December 14th. It afterwards formed part of the artillery reserve of the Second Corps; and though present and occupying several positions at Chancellorsville, it was not regularly engaged. After that it became part of the artillery brigade of the Second Corps, and was engaged with the enemy at Haymarket May 28, 1863.

On the afternoon of July 2, 1863, it was put in position just on the right of Webb's Brigade of the Second Division, and fought hard and well; and when, the following afternoon, this point became the objective of the opposing forces, and Pickett's men pushed forward to the stone wall, Battery A of the Fourth Artillery, just in rear of the wall, though hard hit itself, poured withering fire into the advancing ranks. The battery may well be proud of its magnificent record in the battle of Gettysburg, and Lieut. Alonzo H. Cushing, killed in Pickett's charge, has left a name for gallantry that cannot be excelled.

Cushing and Milne (1st R. I. A. attached) killed, Canby wounded, thirty-eight men killed and wounded, three limbers blown up, carriages and guns broken and injured, and sixty-five horses killed and wounded bear witness to the fact that A Battery was engaged at Gettysburg. What remained of it was attached after the battle to I Battery of the 1st Artillery, but was separated from it July 16th, made a horse battery (2 3-in. rifles and 2 12-pdr. Napoleons), assigned to the First Brigade of Horse Artillery, and remained with it until dismounted in June, 1864.

Its service while a horse battery was with the cavalry, and it fought at Sulphur Springs September 11th and 12th, at Bristoe Station October 14th, and at Parker's Store November 29, 1863.

In Grant's Wilderness campaign, in the spring of 1864, it was engaged

at Todd's Tavern May 5th, at Tiney Woods May 6th, again at Todd's Tavern May 7th, and at Pine Run May 8th.

Starting on Sheridan's raid May 9th, it fought at Ground Squirrel Church May 10th, before Richmond May 11th, at Mechanicsville May 12th, and at Salem Church and Harrison's Store May 28th. It reached Harrison's Landing June 3d, and was there dismounted. It was sent the next day to Washington, equipped as a light battery, and remained in the defenses of Washington from that time until the close of the War.

BATTERY B.—B Battery was a light battery throughout the War. It was armed with six 12-pdrs. until May, 1864, when two of the guns were turned in, and it thereafter served as a four-gun battery. It reached Washington in October, 1861, obtained its new armament, and was assigned to M'Dowell's Division the following month. When Pope's army was organized in June, 1862, it was assigned to the 4th (Gibbon's) Brigade of the 1st (King's) Division of the 3d (M'Dowell's) Corps.

It was first opposed to the enemy at Orange Court House July 26, 1862, was under fire at Cedar Mountain August 17th-19th, engaged in the defense of the Rappahannock at Rappahannock Station August 21st-23d, in action at Sulphur Springs August 25th-26th, fought hard at Gainesville August 28th, and at the second battle of Bull Run August 29th-30th.

When McClellan resumed command of the Army King's Division was assigned to the 1st (Hooker's) Corps. The battery, still with Gibbon, fought gallantly at South Mountain September 14th, and in the battle of Antietam September 17th, when Hooker was directed to turn the left flank of the enemy, B Battery was in the thickest of the fight, and though subjected to a murderous fire at short range dealt desperate and effective blows in return. Lieut. J. B. Campbell wounded, thirty-nine men and thirty-three horses killed and wounded are indicative of the position of the battery in that battle. At Fredericksburg, with Doubleday's Division of the 1st Corps, it crossed the river and was engaged in the battle from the 13th to the 15th of December, 1862, and won the highest encomiums from its corps commander, John F. Reynolds. After the battle it became part of the artillery brigade of its division. It was engaged at Fitzhugh's Crossing April 26, 1863, and was next under fire at Chancellorsville May 4th, 5th and 6th.

After that the artillery of the corps was consolidated and it became part of the artillery brigade of the 1st Corps. It went into action at Gettysburg on the afternoon of July 1st, and was severely engaged, barely escaping capture, and finally fell back to Cemetery Hill. The next day it was hard at work under a very heavy fire, and continuing in position, had the same experience July 3d. Lieuts. James Stewart and James Davison (5th Art. attached) wounded, and thirty-two men and thirty-two horses killed, wounded and missing, one caisson blown up, three broken down, and two guns placed *hors de combat* are indicative of the positions occupied by "Jock" Stewart's Battery on the field of Gettysburg. The battery was engaged at Funkstown July 11th, at Warrenton July 23d; and at Haymarket October 19th, and Mine Run Nov. 30th it was in position.

It fought in the Wilderness in May, 1864, being engaged at Spottsyl-

vania Court House May 12th, Po River May 20th, North Anna May 23d, and Tolopotomy Creek May 25th. It was in position June 1-4th at Bethesda Church, losing heavily in the fighting on the third and fourth days. In position at White House June 15th, and engaged all day in the fighting before Petersburg on June 18th, and remained in that vicinity the rest of the year. It was engaged in a fight at Hatchers Run October 28, 1864, fought well at Gravelly Run March 29, 1865, where Lieut. John Mitchell was wounded, and ended its fighting in the Civil War at Quaker Road March 30, 1865. Its war record is magnificent, excelled by none, and only equalled by that of Battery K.

BATTERY C.—C Battery had to its record, when separated from Battery A in October, 1862, the various engagements indicated in the record given above of Battery A. Its captain, G. W. Hazzard, was mortally wounded at White Oak Swamp. When A and C batteries were separated, the horses, guns and equipments were turned over to C Battery, which remained with Hancock's division of the Second Corps. It crossed the river with the Irish Brigade December 12, 1862, was placed in position opposite Marye's Heights the following day, and during the battle of Fredericksburg, when the infantry struggled so hard to carry the Heights, C Battery did all that it could to assist its sister arm. It next fought at Chancellorsville May 2-3, 1863, where part of the battery was with Hancock and Geary, and when the Third Corps was forced back on Sunday morning the half of C Battery at the Salient Angle, subjected to a terrific fire, poured canister into the enemy not sixty yards distant. The struggle was desperate, Lieutenant O'Donohoe (attached) was killed, and the intrepid Field voluntarily remained with Geary and did good work long after he had been ordered out of action.

The battery was afterwards assigned to Ransom's (First Regular) Brigade of the Reserve Artillery. It was sent forward July 2d to the line of battle at Gettysburg, just to the left of the Second Corps, and on that and the following day was well fought by Evan Thomas, losing Lieut. John M'Gilvray wounded, and seventeen men and twenty-nine horses killed and wounded. In August it was reduced to a four-gun battery (12-pdr. Napoleons), and during October operated with the Third Division of the Sixth Corps. It was regularly assigned to that corps October 16th, and fought at Mine Run November 30, 1863.

It was united with E Battery as a horse battery April 11, 1864 (2 3-in., 2 12-pdrs.) and they remained so united until after the close of the War.

This united battery was at once assigned to the first brigade of horse artillery, and during the spring campaign of 1864 was attached to the third division (Wilson's) of the cavalry corps, and was engaged at Craig's Chapel and Todd's Tavern May 5th; at Spottsylvania Court House May 8th; and, participating in Sheridan's raid, fought at Meadow Bridge May 12th, and at Mechanicsville, May 14th, losing five men and twenty-two horses. Continuing with the cavalry corps it was engaged at White Oak Swamp June 3d, also at Riddell's House the same day. Starting on Wilson's raid June 22d, it fought at Nottoway Court House June 23d, Roanoke Station June 25th, Stoney Creek Station June 28th, and June 29th at Ream's Station, where

Wilson ran into the Confederate infantry, and after some severe fighting the battery was captured. The guns were spiked, the carriages destroyed, and the men mounted on the battery horses with pistols and sabres picked up on the road, fought their way out, and rejoined the horse artillery brigade the following day, after having lost several men wounded and eighteen captured. It was at once re-equipped as a horse battery, receiving the same armament as before.

It went with Wilson's cavalry division to operate under Sheridan in the Shenandoah, and was engaged at Winchester August 17th; Summit Point August 21st; Kernsville August 25th; Berryville September 5th; after which it joined the reserve at Pleasant Valley. October 25th, with a brigade of the 19th Corps, it was successful in repulsing the attempt of Mosby to capture the paymaster's train at Bunker Hill, and joining Sheridan the following day was assigned to the second brigade of the first cavalry division.

The half battery of rifled guns formed part of Sheridan's command; when he made his raid that began February 27, 1865, and this part of the battery did good work in the fights that occurred at Waynesboro March 2d; Dinwiddie Court House March 31st; Five Forks April 1st; Scott's Cross Roads, Sutherland Station, and Brown's Cross Roads April 2d; Nelson's Farm and Sailor's Creek April 6th; Appomattox April 8th; and on the following day formed part of the fighting line that barred Lee's way and forced the surrender of the Army of Northern Virginia.

BATTERY D.—D Battery was mounted as a light battery in February, 1862. (6 12-pdr. guns) and remained a light battery throughout the War. A detachment of it was at Big Bethel June 10th, and at Fort Hatteras August 28, 1861.

The battery formed part of Wool's force for the capture of Norfolk in May, 1862, and the following September was sent to Suffolk, where it remained with the troops under General Peck, forming part of the first division of the 7th Corps; and was sent on various expeditions while serving in that vicinity. The right section (platoon is the name now given to what was then designated a section), under Lieutenant Whitney, was engaged at Franklin, Va., October 4th, and the entire battery having marched 50 miles in 30 hours, was in action at the same place October 31st. It was next engaged when General Corcoran had his fight at Deserted House January 29, 1863 and again the same afternoon, ten miles from Suffolk, losing in the latter fight eleven men killed and wounded. April 24th the left section was in action at Edenton Road under General Peck, and from April 10th to May 30th, the battery was engaged in the siege of Suffolk. It was also in action May 24th while engaged under General Corcoran in destroying the Petersburg R. R.

It fought at Franklin, Va., June 18th, and at Windsor June 22d, being part of the first division of the 7th Corps. When the 18th Corps was organized in April, 1864, to play its part in Grant's campaign against Richmond, the battery belonged to the artillery brigade of the Second (Weitzel's) Division, and moved to Bermuda Hundred in May. The right and left sections were, with the first division of the 18th Corps, engaged against the enemy at Point of Rocks May 7th, and the right section had several men wounded

in the fight near Petersburg May 9th. The centre and left sections were heavily engaged with severe loss at Fort Darling May 14th, the entire battery at the same place two days later, and in front of Petersburg June 15th, 16th and 17th. The left and centre sections were engaged at Deep Bottom July 26th. The battery forming part of the artillery brigade of the 10th Corps participated in the siege of Petersburg, being daily engaged from August 26th to September 24th, 1864, and also fought at Laurel Hill September 29th, and at New Market Road October 7th of that year. It remained in front of Petersburg until December, when it is reported as in front of Richmond, where it remained until April 3d, when it marched through the city that had been so long the capital of the Confederacy.

BATTERY E.—Battery E, armed with 6 10-pdr. Parrott's, was mounted as a light battery at Camp Monroe, Ohio, in August, 1861, and joined Rosecrans' army in West Virginia. In December it was sent to General Kelly at Romney, and a section was with Dunning in his little fight near Blue Gap, January 7, 1863. The battery now belonged to Landers' Division, which afterwards became the second (Shields') division of the 5th (Banks') Corps in the organization of March, 1862. Four guns of the battery were in the skirmishes at Middletown and Cedar Creek March 18th, and the entire battery, with Kimball's Brigade, fought at the battle of Winchester March 23d, and was in the skirmish at Mount Jackson April 17, 1862.

May 1st, Shields' Division was transferred to M'Dowell's department. One section of the battery was engaged at Front Royal May 31st, and June 9th the entire battery was heavily engaged at Port Republic where, after a desperate resistance, it lost three guns and two caissons. One of the guns it had the satisfaction of recapturing during the battle. The lost guns were not replaced; but in July the battery was made a horse battery, retaining its four Parrott guns. When the 1st, 2d and 3d Corps were organized in June, 1862, the battery remained with M'Dowell, being reported as unattached; but in August it was assigned to Reno's Division of the 9th Corps, and was engaged in the defense of the Rappahannock August 15–26th.

Temporarily attached to Hooker's Division it was engaged at Broad Run August 27th. Then rejoining Reno it fought at the battle of Second Bull Run August 29th and 30th, where it "behaved nobly," and was in action at Chantilly September 1st. In the reorganization of the Army it became part of Sturgis' (2d) Division of the 9th Corps, and did good fighting at South Mountain September 14th. It participated in the battle of Antietam September 17th, where Lieut. E. L. Baker was killed, and Capt. J. C. Clark was four times wounded. The battery being without officers, General Hunt selected Lieut. Geo. W. Dickenson, 4th Artillery, to reorganize the battery after the battle and prepare it for field service. Temporarily with Hancock's Division, it was in the fight at Charlestown, W. Va., October 16, 1862. It formed part of the grand battery opposite Fredericksburg, then crossed the river with its division (Sturgis') on the morning of December 12th, and was heavily engaged on the following day, when it was subjected to a terrific fire. In less than twenty minutes "the gallant Dickenson fell gloriously at his post," while twelve of the cannoneers were killed and wounded, and all the men were twice driven from their guns.

In March, 1863, it was assigned to the first brigade of horse artillery. After Fredericksburg "Sam" Elder was placed in command of the battery and retained it until the following November when he joined his own regiment. It fought at Kelly's Ford April 14, 1863, while on Stoneman's Raid, and after returning from the raid the Parrott guns were turned in and replaced by four 3-inch rifles. The battery was next engaged at Beverly Ford June 14th, with Buford, and next with Kilpatrick's division at Hanover June 30th; in the Battle of Gettysburg July 1st, 2d and 3d; at Smithsburg July 5th; at Hagerstown July 6th; at Boonsboro July 8th; at Funkstown July 10th; again at Hagerstown July 11th; at Port Conway September 3d; at Brandy Station October 10th and 11th; at Buckland Mills October 13th; fought again the next day, and again near Buckland's Mills October 19th. October 27th and 28th it was in action while engaged in guarding Raccoon Ford, and in December went into winter quarters with its brigade of horse artillery. A new armament of 3-inch guns was obtained in March, 1864, but on the 11th of April C and E batteries were consolidated and made a horse battery (two 3-inch rifles and two 12-pounder guns) and the war record of E battery from that time on has already been given in the record of Battery C.

BATTERY F.—Battery F arrived in Washington from the West on the 18th of April, 1861, after having had a number of its men injured from stones, etc., thrown by the mob while passing through Baltimore. It was sent to Carlisle in June and there equipped as a light battery (four 6-pounder guns and two 12-pounder howitzers) and formed part of Patterson's command, the sections being distributed to the different brigades. The battery was first engaged at Falling Waters July 2d, 1861; July 8th it is reported as attached to Stone's brigade.

In the organization of the Army, October 15, 1861, it was assigned to Banks' division, of which it then formed part, and was engaged for several days in December in defending dams Nos. 4 and 5. In the reorganization of March, 1862, it was assigned to the First (Williams') Division of the Fifth (Banks') Corps. One section was in action at Newton May 24th, and the entire battery fought in the battle of Winchester the following day. In June, 1862, the armament was changed to six 12-pounder Napoleon guns. When Pope's army was formed Banks' corps became the Second Corps. At Cedar Mountain the battery fought hard and well, suffering severely and losing, by an accident, one gun in the retreat. After Pope's campaign Banks' corps was made the 12th Corps (General Mansfield's) which, after Antietam, became Slocum's. The battery was, in the reorganization, taken from the division to form part of the artillery brigade of the corps, and was held in reserve at Antietam and not engaged during the battle.

It was at Chancellorsville that it covered itself with glory, being engaged May 1st, 2d and 3d. Lieut. E. D. Muhlenberg, with his guns at the angle near Geary, did work of which the battery may well feel proud, for with "courage, coolness and indomitable bravery—he contended against the fearful odds before him until every gunner was killed or wounded at his post, seven horses killed and his ammunition exhausted." Lieutenant F. B.

Crosby, a most gallant and efficient officer of the battery, was killed on the 3d.

We next find the battery engaged at Gettysburg, when July 2d it was in action near Culp's Hill, and on the following day, placed about the centre of the line of the 12th Corps, it rendered valuable service by its work against the enemy. That ended the fighting of F Battery for the War. It went West with the 12th Corps that fall, and in the spring of 1864 was sent to Nashville to form part of the first division of the reserve artillery of the Army of the Cumberland. In October, 1864, it was dismounted, the privates assigned to M Battery, and the officers and non-commissioned officers sent east to recruit. It was not remounted nor did it again rejoin the forces in the field.

BATTERY G.—Early in June, 1861, Battery G was equipped as a light battery (4 6-pdr. guns and 2 12-pdr. howitzers) at Cincinnati, and joined McClellan in West Virginia, being present at the fight at Rich Mountain July 11th. On the 25th of July it was assigned to the Third (McCook's) Brigade by Rosecrans, and subsequently joining the First (Reynolds') Brigade, it fought well at Green Briar River October 3d, losing six men killed and wounded. In December it joined the Army of the Potomac as part of the reserve artillery, and received a new armament of 6 12-pdr. Napoleon guns.

It participated in the Peninsular campaign, being actively engaged in the siege of Yorktown. After that it was attached to the Second (Slocum's) Division of the Second (Franklin's) Corps, and a month later joined Getty's Brigade of Reserve Artillery. June 28, 1862, it joined Naglee (of Peck's Division of the Fourth Corps), who was left behind to hold Jackson in check, and was that afternoon engaged in the fight at Bottom's Bridge. It was on the line of battle and slightly engaged on several occasions during the retreat, serving with Peck, and also Smith's Division of the Sixth Corps, after which it returned to the artillery reserve. It next appeared with Sykes' Division at Antietam, and while the battle was going on was sent to Burnside; but it practically did nothing in that battle.

At Fredericksburg it belonged to the right centre division of the reserve artillery, was placed just to the left of the Lacy House December 10th, and the next day was engaged and did well in covering the crossing of the troops. It was next in action near Falmouth May 3-4, 1863, and the month after was assigned to the Artillery Brigade of the Eleventh Corps. July 1st, with the First (Barlow's) Division of its Corps, it was severely engaged at Gettysburg, losing its commander, Lieut. Bayard Wilkeson, "an officer of great gallantry." That night it was placed in position on Cemetery Hill, where, under Lieut. E. A. Bancroft, it did heavy fighting July 2d and 3d, losing thirteen men and twenty-four horses killed and wounded. It participated in the movements of the Army of the Potomac until that fall, when it was sent West with its corps; fought at Chattanooga October 22d, 23d and 24th, and engaged in the pursuit of the enemy on the 26th and 27th. The matériel of the battery was turned over in February, 1864, to the First Ohio, the officers and men of the battery being sent to Nashville, where in April four guns (4 12-pdr. Napoleons) were given to it, and in June

a full complement of horses was obtained. The battery was dismounted in the following October, the privates transferred to Battery I, and the officers and non-commissioned officers sent to New York to recruit. Its field service in the War of the Rebellion was over, but in February, 1865, it was remounted as a light battery at Washington, D. C.

BATTERY H.—H and M Batteries arrived at Louisville, Ky., in January, 1862, from the West. February 1st they were united, mounted as a light battery (2 3-in. and 2 12-pdrs.), and assigned to Crittenden's Division, that formed part of Buell's command.

At the battle of Shiloh, April 7th, this battery went into action near the left of Nelson's line and did magnificent work, and later in the day, with the 14th Brigade, it added lustre to its record. In the reorganization in May, 1862, it was assigned to Nelson's Division and was engaged in the siege of Corinth; and while in the trenches at that place received two more guns (3-in. rifles). It moved out of the trenches with the 22d Brigade on the 28th of May and seized the bridge at Bridge Creek, where it had a heavy fight.

One section was with Jackson's Cavalry, when he had his fight at Tusculum Creek, May 31st. June 2d the armament was again increased by the addition of 2 12-pdr. howitzers. The battery was at the battle of Perryville, October 8th, but not engaged. When Rosecrans assumed command in October, 1862, it was attached to the Third (Grose's) Brigade of the First (Smith's) Division of Crittenden's Corps, and at the battle of Stone River, December 29 and 31, 1862, and January 2, 1863, it was heavily engaged. A few days after that battle the batteries were separated, H retaining the four 12-pdr. howitzers and M the 3-in. rifles. H Battery remained with Grose's Brigade and fought at Chickamauga, September 19th and 20th, where Lieutenant Robert Floyd (3d Art. attached) was mortally wounded, twenty men and twenty-five horses killed and wounded, and one gun lost. In this battle the battery, under Lieutenant H. C. Cushing, did magnificent fighting and fully earned the high praise bestowed on it.

February 24 and 25, 1864, it was engaged against the enemy at Buzzard's Roost Gap. The following month it was relieved from duty with Grose's Brigade, sent to Nashville to form part of the reserve artillery, and was there dismounted in October, 1864, the privates being transferred to Battery I, and the officers and non-commissioned officers sent east to recruit. It was then sent to Washington where it was remounted as a light battery, in March, 1865, but its war service was over.

BATTERY I.—In June, 1861, Battery I joined McClellan's headquarters in West Virginia, and was present at Rich Mountain, July 11th–12th. July 22d, it was mounted as a light battery (4 mountain howitzers) and three days later was assigned by Rosecrans to the Second Brigade. That fall, with different brigades, it was engaged in several minor actions, viz.: Carnifex Ferry September 13th; New River November 5th; again at New River November 11th, and the following day used two 10-pdr. Parrott's (recently added to its armament) at the same place. Leaving its howitzers in West Virginia, the battery joined Buell's forces in Kentucky in December, there received 4 6-pdrs. (two of which belonged to the 4th Michigan) and was as-

signed to Thomas' Division, which subsequently became T. W. Sherman's. The battery was engaged in the siege of Corinth, in May, 1862, and joined in the pursuit of the enemy after the evacuation of the town. In August it was regularly assigned to the Third (Steedman's) Brigade of the Third (Thomas') Division, which was then under command of General Schoeppe, and participated in the manœuvres against Bragg. After that the section of the 4th Michigan was relieved and the armament of the battery became 2 6-pdr. guns and 2 10-pdr. Parrott's.

The Third Division passed into Gilbert's Corps, and was engaged near Springfield, October 4th, and at Perryville, October 8, 1862. When Rosecrans took command and reorganized the army the battery became part of the Third (Steedman's) Brigade of the First (S. S. Fry's) Division of the Fourteenth (Rosecrans') Corps, October 24, 1862. In February, 1863, its armament was changed to 4 12-pdr. guns. It skirmished with the Confederate Cavalry near Chapel Hill March 3d, and near Harpeth River March 8th, and was sent several times during that month to the Harpeth River to prevent the enemy from crossing. It participated in the Tullahoma campaign, and on the morning of September 19, 1863, opened fire at Chickamauga, where it was heavily engaged on that and the following day, losing Lieutenant N. Redmond wounded, twenty-three men and nineteen horses killed and wounded, one limber blown up and the battery wagon captured. This was the heaviest and most brilliant work of the battery in the War, and the clear judgment of Lieutenant F. G. Smith, in holding it at Snodgrass Hill, after Negley's withdrawal, which subsequently became the key point for the artillery that turned the tide of battle, enhances the value of the work well done.

While at Chattanooga the battery, with the other troops, suffered for lack of supplies and most of the horses died of starvation while standing at the picket line; so that when it moved out in November it had only some thirty nearly starved horses and a few mules to draw the guns and caissons.

At the battle of Chattanooga, November 23, 1863, it was put on duty with the Second (Sheridan's) Division of the Fourth Corps and was engaged near Bushy Knob on that and the following day. It joined, with its own division, in the pursuit on the 26th, but the horses were in such poor condition that it had to be sent back to Chattanooga, where it was dismounted in March, 1864, and sent to Nashville to form part of the garrison artillery. In October it was filled up by the transfer of the privates from G and H Batteries, obtained the four 12-pdr. guns from H Battery, and was regularly mounted as a horse battery. It was assigned to Johnson's Division of Cavalry, and in the following month to Wilson's command of Cavalry. It was engaged against the enemy at Charlotte's Pike December 15, 1864, and at Pulaski ten days later, where, owing to the loss of seventeen horses and lack of support, one gun was lost.

When Wilson prepared for his raid through Alabama in the spring of 1865, the battery under Lieut. G. B. Rodney, with eight horses to each of its four 12-pdr. Napoleons, formed part of Upton's Division. It skirmished with the enemy at Jasper March 26th, fought near Montevallo March 31st,

was present at Ebenezer Church April 1st, engaged at Selma April 2d ; and April 16th did its last fighting in the War at Columbia.

BATTERY K.—In August, 1861, Battery K was sent to Washington, mounted as a light battery (2 20-pdr. Parrott's and 2 12-pdr. howitzers), and in the organization in October was assigned to the Reserve Artillery. In December its armament was changed to 6 12-pdr. Napoleon guns. It remained a light battery throughout the War, retaining its six guns until May, 1864, when two of them were turned in, under the order reducing the batteries to four guns each.

It participated in the Peninsular campaign, being engaged at Yorktown April 28, 1862. June 2d it was assigned to the Third (Heintzelman's) Corps, and fought at Fair Oaks June 25th, at Ropers' Church June 30th, at Malvern Hill July 1st, and again at the same place August 6th. It did not reach Second Bull Run in time to participate in the battle, but was engaged at Chantilly September 1st.

When Burnside took command of the Army it was assigned to the Second (Sickles') Division of the Third (Hooker's) Corps, having been previously part of the reserve artillery of the corps. It was engaged in the bombardment of Fredericksburg December 11th and 12th, forming part of Tompkins' Division of Artillery; then joining Franklin's troops on the following day, it did excellent service against the right flank of the enemy.

May 3d it fought at Chancellorsville, losing Lieut. I. Arnold (Ord. Dept. attached), wounded, and 44 men and 59 horses killed and wounded. It was in this battle, on the height at Fairview, at the extreme left of the crest, while under the most terrific fire, that K Battery won the admiration of all who beheld it, and its record at Chancellorsville under Lieut. F. W. Seeley, that prince of battery commanders, must always form one of the brightest pages in the history of our light artillery. Its work may be equalled but it cannot be surpassed.

After the battle it became part of the corps artillery, was assigned to Humphreys' Division of the 3d Corps for the battle of Gettysburg, and July 2d and 3d did work that, in the language of that magnificent soldier, Humphreys, "excited my admiration as well as that of every officer who beheld it." Lieutenant Seeley was severely wounded and 24 men and 28 horses were killed, wounded and missing. The Battery was next engaged at Union Mills October 18th, and at Mine Run November 30, 1863. In April, 1864, when several of the Army corps were consolidated, the Battery was assigned to the artillery brigade of the 2d Corps, and during the succeeding campaigns of the War, under command of Lieut. J. W. Roder, its hard fighting added to the magnificent reputation it had already acquired. In the Wilderness campaign it was engaged at Spottsylvania Heights May 10th, 12th, 16th and 18th; near North Anna May 23d, 24th, 25th and 26th; at Sheridan's Farm May 30th and 31st, at Cold Harbor June 3d, 4th, 5th and 12th; near Petersburg June 16th, 17th, 19th, 20th and 26th; at Deep Bottom August 16th, and Boydton Plank Road October 27, 1864.

The right section was engaged at Hatcher's Run, February 7, 8, 1865. and the Battery participating with its corps in the final campaign against Lee, was in action near Hatcher's Run March 22d, in the vicinity of Fort

Cummings March 25th, at Hatcher's Run April 1st and 2d, at Sailor's Creek April 6th, and had the satisfaction of being at Appomattox Court House on the 9th of April when the Army of Northern Virginia laid down its arms.

BATTERY L.—Battery L was mounted as a light battery at Fortress Monroe, in July, 1861 (6 12-pdr. Napoleons), and remained so mounted throughout the War. Its first engagement was March 8, 1862, when, from its position at Newport News, it was in action against the famous *Merrimac*.

It was sent to Suffolk in July to form part of General Mansfield's force, and remained in that vicinity until the organization of the Army of the James, when it joined that army and participated in its operations. When the 7th Corps was formed, in September, 1862, the Battery became part of Peck's Division of that Corps. It was attached to Ferry's Brigade in the operations that fall, and fought at Blackwater October 26th, and at Joiner's Ford December 13th of that year.

Getty's Division of the 9th Corps became the 2d Division of the 7th Corps in March, 1863, and the battery was attached to it. It participated in the siege of Suffolk, which lasted from April 10th until May 3d, and also fought near Suffolk May 3d; near Franklin May 16th, and was again in action a few days later, when it assisted in the destruction of the Petersburg railroad. In July, 1863, it was sent with Spear's Brigade of Cavalry on a raid into North Carolina, and was engaged against the enemy's entrenched position near Jackson, on the 28th of that month; after which it proceeded to Winston and embarked for Portsmouth, Va. About this time the 7th Corps was discontinued and the battery was sent to Yorktown in October to form part of General Wistar's command, which in the reorganization of April, 1864, passed into the 2d Division of the 18th Corps, the Battery becoming part of the artillery brigade of its division. A few weeks after, all the batteries of the corps were formed into a brigade of corps artillery.

The Battery moved to Bermuda Hundred with Butler's forces and under General Heckman, was engaged at Valley Farm, May 6, 1864, and at Waltham Junction the following day. It fought within two miles of Petersburg, May 10th, at Proctor's Creek May 13th, and on the following day was engaged for five hours against an entrenched battery. When Grant detached four divisions from the Tenth and Eighteenth Corps at Bermuda Hundred, the latter part of May, 1864, and brought them around by steamer to White House to operate with the Army of the Potomac, L Battery accompanied Heckman's division. While engaged in this movement Lieut. J. S. Hunt (who had relieved Captain R. V. W. Howard of command of the battery the previous September) fell from the steamer the night of May 28th and was drowned. Lieut. H. B. Beecher then took command of the Battery and retained it until the close of the War. The Battery participated in the fighting at Gaines' Farm June 1st, when an attempt was made to force the passage of the Chickahominy, and two days later fought in the battle of Cold Harbor, where Lieut. S. L. Hubbard (2d Mass. Vols. attached) was wounded and 5 men and 14 horses were killed and wounded.

After serving on picket duty on alternate days from the 5th to the 12th of June, it returned to the Army of the James and was engaged in the siege of Petersburg from June 17th until August 28th, in which Lieutenant Beecher and the Battery were highly distinguished. It was in the trenches from the 22d to the 30th of June, from the 1st to the 11th of August (when it was partially engaged day and night), and again from the 14th to the 27th of the same month—during which operations it suffered some loss in both men and horses. August 28th it crossed the Chickahominy, moved to Hatcher's Run, went immediately on picket duty, and was engaged in the trenches before Richmond until the 5th of the following February, when it was relieved from its position and moved to Signal Hill. When the Twenty-fourth Corps was organized the previous December from troops of the Tenth and Eighteenth Corps, the Battery became part of the artillery brigade of that corps and served with it in the operations around Richmond.

BATTERY M.—The story of M Battery in the Civil War, until after the Battle of Stone River, has already been told in the sketch of H Battery.

Batteries H and M were separated immediately after that battle, M Battery retaining the four 3-in. guns, and at the same time increasing its armament by the addition of two 24-pdr. howitzers. It still remained with Grose's Brigade, which became the Third Brigade of the Second Division of the Twenty-first Corps on the 9th of January, 1863. Moving with its brigade the battery experienced all the discomforts of the Tullahoma campaign; and after that, at the battle of Chickamauga September 19 and 20, 1863, under Lieut. F. D. L. Russell, it fought in a distinguished manner, losing 8 men and 13 horses killed and wounded. When the Fourth Corps was recreated September 28, 1863, the Battery passed into it with Palmer's Division and became part of the Artillery Brigade of the First Division of the Fourth Corps. It remained at Chattanooga until November, and was then sent with the First (Cruft's) Brigade to guard the railroad bridge at Bridgeport, Alabama. By the following March it had become so reduced in horses that it was dismounted (turning in its guns and horses at Blue Springs, Tenn., March 19, 1864) and sent back to Nashville to refit. It there received four 12-pdr. guns March 30th, and the necessary horses in May, and again became a light battery. In June it marched to Decatur; but soon after returning to Nashville by rail, it was assigned to the First Division of the Reserve Artillery of the Army of the Cumberland. In October its enlisted strength was increased by the transfer to it of the privates of F Battery of the regiment.

Half of the battery was attached to Croxton's Brigade of Cavalry in October to operate along the Tennessee River, and was severely engaged near Pulaski October 22d, again on October 29th, when Croxton was driven back by Hood, and at Shoal Creek November 4th. The half batteries were reunited at Columbia the latter part of November. The battery was now attached to the artillery brigade of the Fourth Corps, and in Schofield's operations in that vicinity it was placed in position on several occasions. It was heavily engaged at the battle of Franklin November 30th, losing 9 men and a number of horses.

It fought in the battle of Nashville December 15th and 16th, and after-

wards accompanied the artillery brigade in pursuit of the enemy. It then went into winter quarters at Pulaski, where it remained until the latter part of January, 1865. Then proceeding to Huntsville it turned in its horses and moved to Bridgeport with its guns, where it took station in Fort Number One as part of the post artillery.

The following June while at Chattanooga it was mounted as a horse battery, but the War was over and it was soon after permanently dismounted.

Almost all of the field officers and captains, and some of the lieutenants were detached from the regiment and given higher commands during the War, E. O. C. Ord, A. P. Howe, Gustavus A. DeRussy and John Gibbon winning fame as commanders of high rank; while Charles H. Morgan, on the general staff of the Second Corps, proved himself to be a man of the most distinguished military attainments combined with indomitable energy. Morgan was promoted major under the Act of 1866, giving an additional major to each regiment.

By the fall of 1865 most of the batteries had been dismounted and the regiment was again performing garrison duty. Headquarters were at Fort M'Henry with batteries at that post, Forts Delaware, Washington, Foote, Monroe, Whipple, and in Washington City.

D Battery had been sent with its corps to Texas, but returned North and took station at Washington in February, 1866. B and K Batteries having made the most brilliant records in the War, were recommended by the colonel of the regiment to be retained as the two light batteries of the regiment. But the captain and one or more lieutenants of K being absent on detached service, this recommendation was not approved at the War Department in regard to that battery, and G, which had been one of the mounted batteries before the War, was retained as a light battery in its stead.

Light Battery B was sent to Leavenworth and G took station at Detroit.

The organization of a light battery under Orders No. 151, Series 1865, was 74 privates, 73 horses, 56 sabres (the drivers not being armed), and 8 revolvers for chiefs of pieces and caissons. One battery of each regiment was to be armed with 4 3-in. rifles and the other with 4 12-pdr. Napoleon guns.

The regiment retained its stations until November, 1872, the batteries occasionally interchanging, and a number of them doing reconstruction duty in North Carolina from 1870-72. G Battery was dismounted in February, 1869, under the order allowing but one light battery to each regiment, and was sent to North Carolina for duty in that section.

Light Battery B was in the field against the Cheyenne Indians in 1867, and in the campaign against the Indians in 1870, and joined at regimental headquarters in 1871.

When the regiment exchanged with the 2d Artillery in the fall of 1872, headquarters were established at the Presidio of San Francisco with batteries at the various posts in the harbor, two at the mouth of the Columbia River, and two at Sitka, Alaska.

The batteries at the mouth of the river and in Alaska were changed every two years, D, E, F, G, H, K and M serving at the mouth of the river

and A, C, D, F, G, L and a detachment of M in Alaska during tour of the regiment on the Pacific Coast. The Modoc War called a number of the batteries into the field a few weeks after their arrival on the Pacific Coast, A, B, E, G, K and M participating in that campaign which proved so disastrous to the regiment and the Army.

B Battery, mounted on the battery horses, acted as cavalry, while A, E, K and M formed part of Green's command on the south side of Tule Lake.

When the movement was made, in the middle of April, 1873, to close in on the Indians occupying the stronghold in the lava beds A Battery used the Coehorn mortars, while E, K and M acted as infantry; and all four were handsomely engaged in the fighting that occurred on April 15th, 16th and 17th, suffering a loss of ten men killed and wounded; and a detachment of M Battery was engaged April 20th, with the loss of one man. On April 26th occurred the unfortunate affair in which, after desperate fighting, Capt. Evan Thomas and Lieuts. Albion Howe, Arthur Cranston and George M. Harris were killed and twenty-one men of the regiment were killed and wounded. B Battery was in reserve in the fight at Sorass Lake May 10th, and turning in its horses the following day went into the lava beds to the stronghold. Then remounting on the 17th, it started with Green's Battalion in pursuit of the fleeing Indians, had a fight with the Cottonwood Band near Fairchild's ranch, and surprised Captain Jack at Willow Creek. The pursuit was continued the following day, during which a number of Indians were captured.

In the campaign of 1876 against the Sioux Indians, Batteries C, F, H and K formed a battalion under Capt. J. B. Campbell of F Battery.

They left their stations in August, 1876, and did not return until the following January. The battalion reported to General Mackenzie at Camp Robinson, encamped at Red Cloud Indian Agency, and was kept under arms when Mackenzie disarmed the Agency Sioux. When Crook organized his Powder River Expedition in November, the Battalion of the Fourth Artillery formed a part of Col. Richard I. Dodge's command; and during the subsequent operations the discomforts of a winter campaign were fully experienced, the thermometer on one occasion falling to forty degrees below zero.

January 10, 1877, General Brooks was retired and Joseph C. Roberts became the colonel of the regiment. He had entered the regiment as a brevet second lieutenant in 1835, and had risen through the various grades without ever having been out of it. General Roberts was retired July 2, 1877, and William H. French became colonel.

The Nez Percés, under Chief Joseph, broke out in hostilities in June, 1877, and the Fourth Artillery was again called on for field service, A, B, C, D, E, G, L and M Batteries going into the field. E Battery was with Howard at the crossing of the Salmon River, where the Indians were driven back after a brisk skirmish on the afternoon of June 28th. A, D, G and M Batteries joined Howard the next day. Following the Indians, the column next struck them at the Clearwater July 11th, and at one o'clock that afternoon Lieut. H. G. Otis of E Battery was at work against them with his howitzer. The fighting was very heavy, and in the spirited countercharge

against the enemy at 3.30 that afternoon A and E Batteries participated, Capt. E. A. Bancroft of A receiving a bullet through the lungs about this time.

A little later in the day Captain M. P. Miller, of E, led a second charge near the centre, which gained the ridge in front. At daylight the following day, in order to get possession of the spring, Captains Miller (Battery E) and Perry (1st Cav.), with Otis' howitzer, supported by Rodney's (D) Battery, were sent to secure it.

That afternoon Miller's battalion of the regiment (A, D, E, G and M batteries) made a handsome charge, which, after stubborn resistance, broke the enemy's lines. In this fight A Battery lost one officer and five men; E Battery, five men, and G Battery one man, killed and wounded. Just as the Indians were crossing the river the following day the troops came up with them, and some firing ensued.

C and L Batteries were sent from San Francisco, and joined Miller's battalion on the 26th of July. Organizing a column, consisting of Batteries A, C, D, E, G, L and M of the 4th Artillery, the 21st Infantry and the 1st Cavalry, Howard pushed on over the "Lolo Trail," constantly pressing the Indians, who were finally captured by General Miles. The battalion was not again engaged after crossing the Clearwater, but September 12th Lieutenant Otis, with his men in charge of the howitzer, was sent forward with Sturgis' command, and was engaged September 13th in the fight at Canyon Creek. In October the battalion came down the Missouri River by steamboat to Omaha, and from there the batteries returned to their stations by rail. B Battery, equipped as cavalry, had proceeded by rail to Winnemucca, and marched from there to Fayette Lake, Idaho, but was recalled to San Francisco on account of the labor riots which occurred that summer. This cause in the east had taken I Battery from Fortress Monroe to assist in their suppression, and it served at Baltimore, Pittsburg and Cumberland during the troubles. In July, 1878, headquarters were sent to Angel Island, and most of the batteries were ordered into the field against the Bannock Indians. A, B, D, E, the greater part of F, G, H, K and M serving in that campaign. B was equipped as cavalry, and D and G mounted at Grande Ronde Valley the latter part of July formed part of Miles' battalion of mounted riflemen. D and G Batteries were engaged against the Piute Indians at Umatilla Agency, July 13th; and July 31st, Private J. H. Fisher, with three other privates of B Battery, had a handsome little fight with a party of Bannock Indians at Perry Munday's Ferry, and succeeded in defending the station and rescuing the mail stage, the driver of which had been badly wounded.

Regimental headquarters returned to the Presidio in March, 1880. General French retired July 1st of that year, and was succeeded by Emory Upton, whose sad death on March 15, 1881, made John M. Brannan colonel of the regiment.

In October, 1881, C, H and L Batteries were sent to Arizona to take part in the "Apache campaign," but were recalled a few weeks after their arrival, as the regiment was ordered east to take the stations of the 1st Artillery on the New England coast. The following extract from a tele-

gram to the Adjutant-General of the Army from the Headquarters of the Division of the Pacific is indicative of the esteem in which the regiment was held :

PRESIDIO OF SAN FRANCISCO, November 20th.

To the Adjutant General,
Washington, D. C.

* * * * *

In the absence of the Division Commander I say, what I am sure he would have me say for him upon the departure of this regiment, that it has, while in this Division, added to its already splendid reputation, by soldierly efficiency in the field in four campaigns, by continuous exemplary conduct in garrison, and especially by the conspicuous attainments and affability of its officers.

KELTON, A. A. G.

The record of the regiment in the campaigns against the Indians was an excellent one, and while all did well Captain Marcus P. Miller, of E Battery, made a most distinguished reputation.

The regiment remained on the New England coast, with headquarters at Fort Adams, R. I., until May, 1889, when it was sent to the southern stations with headquarters and four batteries at Atlanta, Georgia ; two batteries at Saint Augustine, Florida ; two at Barrancas, and one at New Orleans, La. Light Battery B still remains at Fort Adams, and Light Battery F (mounted August 15, 1882), after serving at Fort Snelling, Minn., from the fall of 1882 until May, 1889, is now at Fort Riley, Kansas.

When General Brannan was retired April 19, 1882, Albion P. Howe succeeded to the colonelcy. He was retired June 30, 1882, and Gustavus A. DeRussy was made colonel of the regiment. This officer transferred with General George W. Getty, colonel of the Third Artillery, July 17, 1882. Generals Brannan, DeRussy and Getty never assumed command of the regiment. Getty, commanding the Artillery School at Fortress Monroe, was retired October 2, 1883, and Clermont L. Best, was promoted colonel of the Fourth Artillery. He took command of the regiment and retained it until retired April 25, 1888, when Henry W. Closson was promoted to the colonelcy.

NOTE.—See next page.

Memorandum.

A COMPLETE Roster of the
Fourth Regiment of Artillery
will follow the foregoing sketch when
the series of Historical Sketches ap-
pears in book form.—[EDS.]



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OUR NORTHERN FRONTIER.

"In times of Peace prepare for War."

BY LIEUTENANT A. D. SCHENK, U. S. A.,

SECOND ARTILLERY.

I. WHAT PROVISIONS SHOULD BE MADE FOR THE PROTECTION
OF OUR NATIONAL INTERESTS ON THE GREAT LAKES IN
VIEW OF EXISTING TREATY STIPULATIONS?

OUR northern frontier when considered from a military stand-point presents several marked features, the most prominent of which are those connected with the Great Lakes. A casual inspection of the map at once reveals the fact that in the event of a war between the United States and Great Britain, whichever belligerent holds the command of these lakes will possess an advantage over the other of predominating importance.

The frontier of the power on our north, of which this chain of lakes forms the most important part, is one of very great extent. With respect to our front its right rests upon the Pacific Ocean, and can be turned by the Pacific States and Territories. The left flank rests upon the Atlantic, with the St. Lawrence River and the Great Lakes leading into the heart of the country along the line of the frontier. The rear is protected by the inaccessible Arctic Ocean. The centre of the line may be con-

sidered as a double one, if such a term be permissible ; one point at which it may be attacked being west of the Great Lakes, to cut the railway system there and to shut off the great wheat producing region ; and the other point further east, the objective point being the provinces of Canada proper. Reciprocally the flanks and centre of the United States are similarly exposed, especially the flanks, to operations from the sea,—England's great national base of operations ; while there exists the further danger of exposure to direct attack by sea from the British West Indies.

Owing to the length and character of the Dominion frontier, coupled with the distribution of the population, it will be impossible for the English to defend it throughout its whole length. Their principal defense will be confined to the older provinces of Canada proper, which present a long strip of communications, its main artery, the St. Lawrence River, being the fosse of a natural fortress, open during the summer season (winter operations for a large army may be deemed impracticable in that climate) to the navy of England, and to her alone so long as the fortress of Quebec is kept in a defensive condition.

West of the river proper, the command of this great moat, and the vast advantage which its possession insures, will depend upon the ability of Great Britain to secure and maintain possession of one or more of the Great Lakes.

Once the control of even lakes Ontario and Erie is secured to the vessels of the English navy, it will require no labored argument to impress upon any mind, however ordinary, the stupendous advantages at the disposal of the enemy, not merely for defensive, but for offensive purposes also,

If there is even a reasonable possibility that England may, in the event of war, secure, for however short a time, such control, it is only too evident that it is the imperative duty of this Government to take all needful measures to prevent so dire a calamity and to secure from capture and destruction the vast interests of the United States upon these lakes and upon their shores. In the endeavor to secure this great end, the Government is greatly handicapped by a specimen of the astute statesmanship of our past history, designed no doubt to exclude the English navy from the Great Lakes ; the practical result being that to-day these lakes in the event of war are free to a large contingent of that navy, and not to our own.

TREATY OF 1817. Arrangement between the United States and Great Britain, made by Richard Rush, Esq., acting as Secretary of the Department of State, and Charles Bagot, His Britannic Majesty's Envoy Extraordinary, etc., concluded April 28, 1817.

The naval force to be maintained upon the American Lakes by his Majesty and the Government of the United States shall henceforth be confined to the following vessels on each side ; that is—

On Lake Ontario, to one vessel not exceeding one hundred tons burden, and armed with one eighteen-pounder cannon.

On the upper lakes, to two vessels, not exceeding like burden each, and armed with like force.

On the waters of Lake Champlain, to one vessel not exceeding like burden, and armed with like force.

All other armed vessels on these lakes shall be forthwith dismantled, and no other vessels of war shall then be built or armed.

If either party should hereafter be desirous of annulling this stipulation, and should give notice to that effect to the other party, it shall cease to be binding after the expiration of six months from the date of such notice.

The naval forces so to be limited shall be restricted to such services as will, in no respect, interfere with the proper duties of the armed vessels of the other party.

After reading the provisions of this unique treaty, it is not at once apparent "what provision should be made for the protection of our national interests on the Great Lakes." We dare not "give notice," for that might mean war, for which we are utterly unprepared, and if we were to attempt to get ready for one, England might wait only long enough to send over her fleets and then proclaim the declaration of war with a blow.

This Government having, as its statesmen supposed, evaded the necessity of maintaining a proper defense upon these lakes, rested.

England, on the contrary, has had the foresight and military sagacity to build systems of canals which enable her to float her naval vessels from deep water on the St. Lawrence to the upper Lakes, the ostensible purpose of these great works being the assistance and development of commerce.

What the national interests are in and along the Great Lakes it is not necessary here to point out, they are known to all the world. The entire limit to which this paper is restricted would suffice to convey but a faint idea of the vast commercial, material and political interests which are here at stake, exceeding in value and importance those of the whole United States of but a few years ago. It might be a reasonable supposition that due precautions have been taken for the protection and assurance

against loss or destruction by a possible enemy, of these great interests.

Yet it is a fact that the United States, having secured this great treaty of 1817, appear to have reached the conclusion that safety and security are assured, and nothing further is necessary.

In the past time of our history, there appears to have been an idea prevalent that some means of defense, even for the relatively small interests then at stake, were an absolute necessity, and a very comprehensive and perfect system of defense for that day was designed, and about the years 1839-43, such works as Fort Ontario, Niagara, Porter, Wayne, Brady, etc., were *commenced*. These works have never been completed, have no armament, and, in the language of the annual reports of the Chief of Engineers for the past few decades, are even "much in need of repairs."

The means for the defense of our "national interests on the Great Lakes," are simply grotesque, a travesty upon a modern system of defense too absurd to merit contempt, however good it may have been in the past. Behind this system stands the Regular Army, a body of nearly twenty-five thousand men. Also, as a reserve, a so-called Militia, aggregating 91,290 men, much of it existing "on paper" only, poorly armed, and in case of a sudden war without the power of speedily getting a better equipment; without a proper organization and, being purely a militia of the individual States as such, of no practical value for national defense: a fact demonstrated in every war from that which secured the independence of the country to the present time. It is drawn from a force of over eight millions of able bodied men who may be called upon for the defense of these interests; a mob, without organization, discipline, officers, or arms, and without the power of obtaining these indispensable equipments of a soldier in case of a war with England, save by the slow process of manufacture at home, and this means that, whatever other advantages we may possess, we have not at our command, *time*, the mightiest factor in the drama of modern war.

In the event of war with England, if we have no well-digested system of defense ready for use, her war vessels will enter the Great Lakes, and without the necessity of landing can either destroy the property along the shores, or else lay the people and the cities under contribution. There would be no time for preparation to meet the assaults of such vessels. With a fleet, or

even a single vessel of this kind in front of a great city, it would be of no avail to collect troops to protect it. Nor to produce the torpedo boats which may have been sent on by rail. The slightest sign of an attack upon the enemy's vessel would cause her to open fire upon the doomed city. We have wonderful railway facilities, but what would it avail to concentrate 100,000 men within even twenty-four hours at the threatened point? They would be of no use against an armored ship. Suppose that in a night the men so concentrated would throw up earth-works and mount our old obsolete guns (if it were possible to handle guns of even their small size with the rapidity assumed), what injury could be done to the ship? It would take position out of their range and bombard the city in safety.

But it is idly claimed that we could mount guns as powerful, or even more powerful than those of the enemy. No doubt, if we had them and had the time! Possibly the citizens would approve the idea of having such batteries constructed along their lake front, where every shot which missed a battery would hit the city to a dead certainty! And if the batteries are not constructed there, the vessels would again be out of range, and at liberty to give undivided attention to the city. The lake front of a city cannot be strewn with torpedoes, and if it could be they would be of no avail unless protected by guns ashore. A single vessel can lay under contribution any of the lake cities before which she may come, and the rather unruly population of any of these cities, rather than have their homes bombarded by an enemy, would much prefer hanging to the lamp-posts any bankers or other capitalists who might demur at having to advance the money required to prevent it. The shipping would have to be destroyed, or the enemy would tow it over to Canada as a prize. As there is a goodly amount of it, it is but natural to expect that the British tars will not be slow in getting at it.

That the "national interests upon the Great Lakes" are utterly defenseless in case of sudden war with England, and at present equally incapable of being defended in the event of such a war, is patent to all men.

When the gravity of this state of affairs is seriously considered, the indifference of the public to this grave subject is a matter of amazement. This cannot result from want of information, for the subject has been presented by the proper authorities again and again; it cannot result from any inherent difficulty in the

subject, for it is one devoid of professional technicality, so simple that the commonest mind may comprehend it; nor can it be because it is without interest, for it is of vital interest to the nation. But it would seem that what concerns the body corporate, is everybody's business, and as such is outside of individual concerns, with which "the people are so wrapped up that public affairs are put out of sight," and instead of any attempt being made to remedy the evil, it would seem that "the people prefer to erect a great counter along the whole lake front, behind which they stand in expectation of the Almighty Dollar like so many linen-drapers."

We are content to live on in a fool's paradise, from which we may one day be rudely awakened to a realization of our utter defenseless condition, and absence of preparation for any war, however trivial.

We are constantly reminded that we do not need much preparation beforehand, for we have "the men and the money," the best railway system in the world, all military resources without limit; can concentrate any number of men at a threatened point at pleasure, together with other advantages almost without limit. Admitted all this. To what military end would a million of men contribute, assembled without arms, organization, administration, or anything adequate to transform them rapidly from what they would practically be under such circumstances—a mob, into an army? Which party would the railways most aid, the invader or the defender? Of what avail all the undeveloped military resources imaginable, when time and money, costly machinery and practical skill, are prime requisites to their conversion into available military resources? A year or two to convert the men into soldiers and armies; a year or two to convert the iron into modern steel guns; a year or two to commence building a navy; a year or two with a steadfast determination to accomplish the ends in view, and we might indeed make some adequate preparation for war. But how are we to command this indispensable element of time? Modern wars are begun and ended in half this time. "Ninety-day" gun boats can again be built, but they would now have to meet a thoroughly prepared enemy, and would be of no avail, for though it might be possible to build the boat, it is not possible to build a modern high power gun in "ninety days."

The power of rapid and sudden concentration upon any given point is so certain in these days of large and rapid steamships,

that the appearance of armies at our doors would be almost simultaneous with the declaration of war, and no nation of the world possesses this power to such a vast extent as England. That there is danger to this country in such a state of our defenses as now exists, no man can reasonably doubt. Our wealth has increased to such marvellous proportions as to become a temptation to any powerful and warlike nation, possessing a large and costly armament, with little or no employment for it at hand.

Peace, so ardently desired by the industrious millions, seems to be as precious as it was at the dawn of man's recorded history, but that history in every part reveals the fact that war is a universal element of nature, and especially of human nature, and that no nation or society can justly or safely deal with the affairs of this world which does not recognize this fact, and take due precautions accordingly. To prevent danger from war and thus provide the greatest security, costs money, much money, liberally and judiciously employed and expended ; in fact, that we should carry a reasonable policy of national insurance.

It is a matter of constant wonder that a nation composed of as able and shrewd business people as can be found in the world, is content to neglect so utterly a matter so important as a proper and adequate system of national preparation for defense. Individually we pride ourselves—and with reason—on the prudence with which we conduct business matters. We scrutinize with care our position in its every relation ; make ample preparations to meet every liability, and add to our reserves as these liabilities extend ;—contenting ourselves with reasonable profits that we may be able to insure against the loss of the machinery, or of the vessels, or the destruction of the roads or other means by which our business is carried to market or conducted, and yet we cannot as readily determine to conduct the affairs of a great nation in this same plain, business way, and pay the paltry insurance that will suffice to keep our house in safety and our goods and our lives in peace.

The fact that the national interests on the Great Lakes are utterly defenseless being patent to all men the provision which should be made for their protection is equally evident. It is simply for the nation to appropriate the necessary funds, and to order the proper officers to go to work at once to remedy the defect. That they have not the ability so to do if furnished with the necessary means, no one has undertaken to assert. In fact it is hardly a

question of professional ability at all. The application of the same means which has placed the supremacy on these lakes within the power of England, will restore it to us. If she has built a canal with locks 250 feet long and 14 feet over the mitre sill, enabling her to place a certain class of vessels upon these lakes—which vessels she has also of course taken the precaution to provide; we can, and must, build a canal with longer locks and more water, and provide a fleet of vessels ready for service, which shall be able to meet and destroy any that England can bring into these lakes. If necessary locks 300 feet long, with 15 feet of water on the mitre sills.

Wholly aside from the absolute strategical necessity for such a canal or system of canals, will be their inestimable commercial value to the nation, which alone will repay their cost many times. If it is found, as will most likely be the case, that the railway companies are hostile to such measures, and endeavor to prevent their speedy accomplishment, they should be held to be, and treated as, the worst enemies of the country.

Although a canal system is the paramount requisite to the proper defense of our lake interests, others of minor importance are of more pressing necessity, and should be provided with the least possible delay. What they are, can probably be best indicated by the official report to Congress by the Fortification Board.

(4) *The Lake Posts*.—The situation being peculiar, an explanation becomes necessary.

The treaty of 1817, between the United States and England limited each party to an insignificant naval force upon the Lakes. At that time the country on both sides was undeveloped; with the exception of Detroit there was nothing perhaps deserving the name of town upon the upper Lakes. Everything has changed; large cities as centres of commerce now dot the coast of the lakes, and the wealth and property liable to capture and destruction are enormous in amount.

In the meanwhile our neighbors over the line have surmounted the rapids of the Saint Lawrence and the Falls of Niagara by canals which, in their present condition, permit the passage of boats of 9 feet draught, and when the improvements shall have been finished will have a draught of 14 feet. The present draught will admit many gunboats now in the possession of Great Britain, and when the depth of water is increased, armored vessels from the other side of the Atlantic may float in the waters of Lake Erie. A state of war, therefore, with that power, would at this time, unless something be done to avert the consequence, involve the lake cities in frightful losses or even destruction. These cities, being upon the shore, could not by land forts be protected from bombardment. Fort Wayne, on the Detroit River, if supplied with suitable armament well placed, could, with the assistance of submarine mines and torpedoes, prohibit a passage into Lake Huron. The canal at the Sault Ste. Marie would also demand a fort to protect it from destruction.

Our commerce on the Upper Lakes is much more extensive than that of Canada, and doubtless many of the steamers might at a pinch be converted into light-armed naval vessels. But to do this, with any prospect of anticipating the arrival of British gunboats after the declaration of war, the vessels should be inspected, beginning now, and the inspection continued, so that a perfect knowledge might be obtained of the number and description of all that might be fit for the service designed, and plans of their modification to receive guns be made and kept, so that when the vessels are wanted there should be no unnecessary delay in preparing them for service. It is needless to state that the guns and other necessary material should also be provided, ready for use at a moment's warning.

Upon Lake Ontario the Canadian commerce is superior to ours. Some protection, however, would be needed here, which, imperfect as it is, might serve a good purpose. It is proposed to keep in one of the interior lakes of New York, vessels armed with light guns, and furnished with self-moving torpedoes, to be sent when needed, by canal into Lake Ontario.

Some might be sent to Buffalo for service in the Upper Lakes. A port of refuge against the superior naval force of England should be provided in the lower part of Lake Ontario.

The fort at Rouse's Point is sufficient, with the addition of a few 8-inch rifles, to secure Lake Champlain from an inroad. It may be observed that one or more fortifications on the St. Lawrence River would be required, which in the event of hostilities, could at once protect our frontier and command the water approaches to the Lakes. They would be more reliable than an improvised fleet upon Lake Erie, though they could not wholly take its place.

PROPOSED ARMAMENT.

Locality.	Calibre.	Kind.	No.	Remarks.
Fort Wayne.....	10-inch	27 ton guns.	3	Breech-loading Rifles.
	8-inch	13 " "	3	" "
	6-inch	5 " "	4	" "
	10-inch	Mortars.	8	Rifled.
Proposed Fort on St. Lawrence River....	12-inch	50 ton guns.	2	Breech-loading Rifles.
	10-inch	27 " "	6	" "
	10-inch	Mortars.	8	Rifled.
Fort Montgomery } Rouse's Point	8-inch	13 ton guns.	4	Breech-loading Rifles.
	10-inch	Mortars.	8	Rifled.

The interior lake or other place where naval vessels are to be kept, must of course have quick and easy access to the water of the great lake, and it is hardly necessary to point out that a sufficient force must always be at hand to secure the place from any sudden descent and attack.

The forts upon the St. Lawrence can be so placed as to prevent vessels from passing, and also to bring the canals and locks under command of their guns, when they may readily be destroyed if necessary.

Other means are necessary for the proper protection of the lake interests, but as they pertain more particularly to another branch of this subject, they will be developed further on.

The money value of the destructible property within easy reach of the enemy, exceeds \$1,000,000,000. Any wise and competent business man having property at great risk thinks nothing of paying annually one, or one-and-a-half per cent. as an annual premium for insurance against even partial loss. The premium in this case to be paid annually, would amount to ten or fifteen millions. One-half of the smaller sum if expended yearly by this Government for only a very few years would readily place the Great Lakes within our military control, and assure the protection and security of all our interests connected therewith, and at the same time, and what is really of far greater consequence, the chances of war occurring would be greatly reduced.

A nation is not so apt to be attacked when ready and capable of making a good fight.

Given the necessary authority, and a tithe of the enormous surplus of the national income, and our Navy and Army officers will soon perfect and develop all of the necessary means and "provisions for the protection of our national interests upon the Great Lakes" without losing from view the provision of the existing treaty, and also with strict adherence to any other reasonable stipulations. Without money, and plenty of it, nothing can be done or expected.

II. TOPOGRAPHY OF OUR GREAT LAKE CITIES.

The peculiar topographical features of these cities, to which attention is here sought to be called, exists in the fact of their utter indefensibility by any of the ordinary arts of the military engineer. A description of the location and topographical surroundings of one city, will be in effect the same for all others.

Take for instance the city of Chicago, built upon the margin of Lake Michigan, extending along the shore for eight miles, and back therefrom for six miles, with a population of over 500,000. An enemy's war-vessel finds any desired depth of water right up to the very shore, and could bring every foot of ground, and every house in the city, within range of its guns. There is absolutely no site whatever for defensive batteries, or for the emplacement of guns, except upon floating batteries, and these we are precluded from building by the terms of the treaty of 1817.

It would be worse than useless, as has heretofore been pointed out, to mount guns along the lake front of the city; a measure not to be considered for a moment. To place batteries off on the flanks of the city would be as useless as to erect them in the heart of the continent. To attempt to place a system of torpedoes in the deep waters of the lake, for the purpose of keeping an enemy's vessels out of range of the city, is impracticable; and if it were not, the system would be valueless, unless strongly defended by land forts and batteries, or a sufficient naval force of gunboats or other naval vessels. Small torpedo boats can readily be sent by rail to Chicago, but they are of little value unless accompanied by regular war-ships, and in any event they will be met by a stronger force of more powerful boats of like character, than can possibly be transported by rail.

Great reliance has been placed upon the value of movable torpedoes for defensive purposes, but recent experiments in England, against the old *Resistance*, a worn-out and condemned ship of the navy, by Whitehead torpedoes sixteen feet long and charged with ninety-three pounds of gun cotton, demonstrated the fact that the regulation wire torpedo-netting stopped the torpedo in every instance, and though torn at the point of contact was not greatly injured by the explosion.

As regards the ship, the experiment proved that, with the netting at a distance of twenty-five feet from the hull, the explosion of the torpedo was perfectly harmless. At a distance of twenty feet some slight damage was done. At a distance of fifteen feet the explosion seriously damaged and displaced some of the armor plates, causing considerable leakage, but not enough to cripple the ship, much less sink her. It was considered certain that a vessel protected by netting placed twenty-five feet from the hull is absolutely safe from attack by this class of torpedoes. But it was determined in these experiments to ascertain the maximum effects to be expected from such torpedoes. Accordingly one was attached longitudinally amidships, just above the bilge-keel of the old and already shaken hulk; and in that position it was exploded. Of course it was expected that the vessel would be blown into the air. But nothing of the kind occurred. The old *Resistance* proved worthy of her name. She was seen to sway a little, and on examination it was found that the bilge-keel was broken to an extent of twenty feet, and that several holes had been made in the hull. But only one of her

compartments was filled with water, nothing happened to prevent the working of her guns, and she was in condition to be brought into the harbor for repairs.

It is true that this vessel is much larger than any which can be brought into the lakes, but it is also true that she is one of the old type, a worn-out and condemned hulk, and not so strong, nor so capable of resisting such attacks as smaller vessels of more recent construction.

These experiments go far to confirm the opinions of many able naval authorities that the popular idea of the destructive effects of torpedoes is highly exaggerated, and that the torpedo-netting as now perfected is a certain means of defense against them.

But, as has already been stated, it is here useless to attempt any of the ordinary means that may be devised for the defense of a city or place, when once the enemy brings the city under command of his guns. Unconditional surrender and submission to his will is then inevitable, or the penalty will be destruction. How sudden and complete such destruction may be accomplished is evinced by the results of the great fire in this very city of Chicago in 1871, where every effort could not prevent the destruction of property to the value of \$196,000,000 in a few hours. It may be idly hoped by some that an enemy would not resort to such extreme measures. He probably would not do so, provided always that the city surrendered at discretion, and strictly complied with his orders. Otherwise he would destroy the place to a certainty, and there is nothing in the history of war, even as practised by ourselves, to lead any one to expect other results.

Our own practice during our late War, of holding that all railway property is a great military resource, a resource upon which we now predicate much of our supposed security, leads us to expect that all property of this character which cannot be carried off will to a certainty be destroyed. This is a fact which railway corporations and their attorneys might well bear in mind when opposing the construction and completion of a proper system of strategic canals. These corporations have a vast deal of property which would readily come within the destructive reach of an enemy, who would be sure to destroy it, and there would be no likelihood that the Government would ever reimburse them for the loss of such property in that way.

From whatever point we may consider the topography of the lake cities, with a view to remedying their utterly defenseless and apparently indefensible condition, and of securing from capture or destruction such a vast amount of property; we are ever brought face to face with the one great topographical feature so prominently connected with this whole subject, the Great Lakes themselves. It is perfectly evident that if the possession and command of these lakes be secured to our arms, the safety and protection of these cities, save from attack by land, is at once and completely assured; and it is equally evident that their possession by the enemy secures to him the ready capture of the cities beyond the possibility of a doubt, together with other military advantages and consequences the most grave and momentous. Further, the control of these lakes admits of no division. It must indeed be with us a question of all or nothing, and this Government must take measures, no matter what the cost may be, to render her military control of all of them absolutely certain. In this way, and in this way only, can the safety of these cities and the other great national interests connected with the Great Lakes be secured.

III. "NAVAL POWER OF GREAT BRITAIN."

The table found on pages 106-116 of the report of the Endicott Board, gives the characteristics of the principal vessels of the English navy. There is a large number of vessels not represented in this table, but which would no doubt be made available in the event of war. Among these may be mentioned over 400 of the fast iron and steel merchant steamers, the finest in the world, which are on the Admiralty list. Not only this, but what is of far greater moment, they have at hand all of the guns and other necessary material requisite for readily and speedily converting these vessels into war-ships of great value and high speed. From the table referred to it would appear that there are 226 vessels with 1470 heavy guns of from 5 inch to 16.25 inch calibre, with crews aggregating 40,242 men. They carry, besides, a large number of quick-fire and machine guns, and 42 second-class torpedo boats. How many torpedo boats there are in the English navy does not appear, but they already number several hundreds, and large additions are constantly being made. The naval fleet of England, then, if deemed necessary, will aggregate over 600 vessels.

Although our coast line is one of great extent, yet in the present state of our preparation this fleet could capture or destroy any or all points upon the coast deemed of sufficient importance. Even were our land defenses complete, this fleet is yet capable of maintaining an efficient blockade of all our important harbors and seaports where ships may be constructed.

Great as is the extent of our own coast line, it remains a fact that the rivers, harbors and bays of any considerable maritime importance are comparatively few in number, viz. : the Penobscot and Kennebec rivers ; the harbors of Portland, Portsmouth (N. H.), Boston and New Bedford ; Narragansett Bay ; the harbors of New London, New Haven and New York ; Delaware River ; Hampton Roads ; the harbor of Beaufort, N. C. ; Cape Fear River ; the harbors of Charleston and Savannah ; Cumberland Sound ; the harbors of St. Augustine, Key West, Dry Tortugas, Pensacola and Mobile ; Ship Island ; the Mississippi River ; the harbor of Galveston ; the bays of San Diego and San Francisco ; the Columbia River and Puget Sound. A total of 29 points of first importance to be closed by the enemy's fleet, and which when closed would practically bring the foreign trade and commerce of this country to a stand-still.

The would-be wise call attention to the fact that England also possesses a vast mercantile marine, which is in danger from our *privateers*. These people are yet living in the days of 1812-15. The less said about privateers the better. These must now be fast steamers, and where have we one that can compete with the hundreds possessed by England ? How long would it take us to build such vessels, even if every one of our ship-yards were not already in the hands of the enemy ? Suppose we had the vessels, they would be watched and pursued by the enemy, and where are our coaling stations all over the world to enable us to keep the seas ? England alone has these fast steamers, has the men to man them, and the guns and material at hand to arm and equip them, and is under no obligation not to use them against us ; and she has the necessary coaling stations in every quarter of the globe. She would sweep the last ton of our shipping from every sea before we could raise a hammer to construct the privateers which these visionaries count upon to do her so great damage.

In the present state of our defenses England can capture every ship-yard in the country. Even when we are secure against

this danger, the privateers upon which such great store is set, if without the assistance of a powerful navy, would have to evade a powerful blockade and escape to sea in the face of the swiftest vessels that now sail the seas. If successful in escaping they would then be dependent upon a precarious coal supply.

Thanks to England's present position upon the ocean, her naval officers and merchant sailors now believe as much in privateers as did those of our country in past times. Being now in position to profit by this kind of warfare, she will no doubt adopt it. When of old time her sailors indulged in this species of genteel piracy, they left no lessons to be improved upon by the best Yankee who ever sailed a ship.

It is common for the people of this country to limit all considerations of danger from England's naval power to the ocean seaboard, but a short study of the publication of the Naval Intelligence Bureau, entitled "Notes on the English Navy," shows us that this Power has fifty-seven war vessels drawing less than 12 feet of water and over 9 feet; ten drawing between 7 and 9 feet; and forty-four drawing less than 7 feet; a total of 111 vessels; three of which are armored, and all of which are available for service upon the Great Lakes.

IV.—RELATIVE FACILITIES FOR OBTAINING AND MAINTAINING SUPREMACY ON THE LAKES IN THE EVENT OF WAR.

These comprise in general the lake mercantile marines of Canada and the United States, and their availability for war purposes; railways as a means of transporting torpedo boats and other naval or war material; and, most important of all, the canal systems of the two countries, and their relative capacities to float war vessels from the ocean to the lakes. Also, in connection with any or all of these, the relative powers of the two countries to destroy, or prevent their use for such purposes.

Of the canal system of the United States, the Erie Canal and its connections is the only one of much present value for the purposes indicated. The limited size of its locks and depth of water over the mitre sills, render it incapable of furnishing the means of conveying to the waters of the lakes any war vessels save those of the smallest size and power. But even of these we have none. The locks are only 110 feet in length, 18 feet wide, with 7 feet of water over the mitre sills, permitting the passage of boats $98 \times 17\frac{1}{2} \times 6\frac{1}{2}$ feet, or of 225 tons.

The canals of Canada are among her most important public works, their estimated cost being over \$60,000,000. Ships of 4500 tons burden can enter the harbor of Montreal by a canal unsurpassed by any other canal works, excepting those on the Clyde; and from thence, propellers of 1500 tons can proceed to the head of Lake Superior. The exact nature and extent of the system of canals constructed for the navigation of the St. Lawrence River, and the chain of lakes, is given in the appendix to the annual report of the Canadian minister of railways and canals for the fiscal year July, 1883, to June 30, 1884. All permanent works of this system, such as locks, bridges, sidewalks, etc., have been built with a view of having a depth of 14 feet over the mitre sills. At present all of them have ample depths for vessels of 9 feet draught, some of them for 12 feet, and the improvements upon all for this depth will soon be completed.

The Welland Canal, connecting lakes Ontario and Erie, will soon admit vessels 250 feet long, 38 feet beam, 22 feet depth of hold, and 14 feet draught.

The canals of the St. Lawrence system above Montreal are the Lachine, the Beauharnois (the only one on the south side of the river), the Cornwall, and the Williamsburg, the last named including Farran's Point, Rapide Plat, and Galop's canals. This system necessitates the navigation of the river along the borders of the State of New York, and can readily be destroyed or rendered temporarily useless by properly situated and equipped forts upon the south bank of the river. (It is hardly necessary to say that the United States Government has not taken any practical steps towards the construction of such forts.)

This fact necessitated the building of another system, entirely beyond the reach of hostile demonstrations—the Montreal, Ottawa and Kingston route. This extends from the harbor of Montreal, passing through the Lachine Canal, the navigable sections of the Lower Ottawa, thence by the Rideau River and Rideau Canal to Kingston and Lake Ontario. Total distance, 245 $\frac{5}{8}$ miles. The system is closed by ice from about the last of November to about the 1st of May. The depth of water contemplated upon the entire completion of the system is 9 feet over the mitre sills, the locks being 200x45x9 feet.

The Trent River navigation presents features of great strategic importance, though of but little present practical value. It is more than probable that the date at which the United States

commence the construction of proper works upon the banks of the St. Lawrence, will see the inauguration of the work necessary for the speedy completion of this system of navigation, thus flanking our efforts upon that river as well as upon the St. Clair, and giving the Canadians access into lakes Huron and Michigan, as well as into lakes Ontario and Erie. This system consists of a series of water stretches from the mouth of the Trent on the Bay of Quinté, on Lake Ontario, to Lake Huron. It is not now a connected system of navigation, and in its present condition is only efficient for local use. The route is from Trent River through Rice Lake, Otonabee River, and lakes Clear, Buckhorn, Chemong, Pigeon, Sturgeon, and Cameo, to Lake Balsam, the summit, 166 miles from Trenton; from Lake Balsam by a canal and Talbot River to Lake Simcoe; thence by the Severn River to Georgian Bay, Lake Huron, 235 miles. The execution of this scheme, commenced in 1837, was subsequently deferred, but certain works have been done establishing communication with the town of Lindsay and through Lake Scugog to Point Peney, 190 miles from Toronto; 155 miles of this distance being navigable for light draught vessels. In connection with this scheme the Murray Canal is being constructed across the Murray Isthmus, to connect the headwaters of the Bay of Quinté and Lake Ontario. This cut is $4\frac{1}{8}$ miles long, and the canal will have a draught of 11 feet below the lowest known water-level of the lake, and a width at bottom of 80 feet. There are no locks.

There is, however, another system of navigation proposed, of vastly greater strategic value than any of these, viz.: that by way of the Ottawa and French rivers to Lake Huron. Such a canal would, in a military sense, be the most important in Canada, and its speedy completion would probably be contemporaneous with the works undertaken by the United States Government along the St. Lawrence and elsewhere. This line perfectly fulfills the essential condition of being removed from the frontier and the immediate reach of the enemy. There is hardly a military requisite for its easy defense that it does not fulfill. If this communication were opened, so long as England maintains her supremacy on the ocean (and when she loses that she will no longer be England), her gunboats could be as freely placed upon these lakes as now on the St. Lawrence at Quebec. This canal is of vastly more importance to the Dominion of Canada, in a

military point of view, than any other can possibly be, and would be of equally great commercial value. It is the best work of defense that can be constructed in Canada, and is already complete to Ottawa.

The remaining system of navigation to be considered, with reference to strategic lines of communication, is that of the Richelieu River and Lake Champlain. It commences at Sorel, at the confluence of the St. Lawrence and Richelieu rivers, 46 miles below Montreal, and extends along the latter river through the St. Ours lock to the Chambly basin, thence by the Chambly Canal to St. Johns, and the Richelieu River to Lake Champlain, a distance of 81 miles, with a depth of 7 feet on the mitre sills.

These complete the inland water lines of communication possessed by the Dominion of Canada, which, in the event of war, can be used to facilitate the concentration of a powerful naval force to operate at places along the frontiers of New York, Pennsylvania and Ohio; for it is assumed that we can block the passage through the Detroit River, if not by fortifications, at least by sinking barges or other vessels in the canal through the St. Clair flats.

A list of the vessels of the English navy available for service upon the lakes, has already been referred to, and it may as well be noted here that in a short time, this list will be greatly increased in numbers, and vastly in power, by the addition of a fourth class with less than 14 and over 12 feet draught. This class will add to the list 35 vessels, 4,126 men, and 285 heavy guns, besides machine and quick-fire guns.

What use could be made of the mercantile marine in the event of war, seems to be a question for naval experts. On Lake Ontario that of Canada preponderates and all the best harbors are on her coast.

From the United States census for 1880 there appears to have been at that time upon the northern lakes and their tributary waters (excluding Lake Champlain) 947 steamers of all classes, measuring 222,290 tons, and giving employment to 9143 men. During the year 1880 these steamers carried 1,356,010 passengers, and 4,368,171 tons of freight, not including lumber. The military student can better deal with this tonnage as a means of transportation for an army and its supplies than as a war resource in a naval sense, the development of which pertains to that department of the Government.

For purposes of transportation a French writer has declared the following rule: "For each man (including subsistence), one register ton; for each horse (including forage), 3 register tons; for each two-wheeled wagon, 5 register tons; for each four-wheeled wagon, 10 register tons; for each bridge wagon, 15 register tons." The transportation of an army corps of 36,964 men, 8071 horses, 739 two-wheeled wagons and 671 four-wheeled wagons, requires 71,582 register tons of shipping.

The Canadian sea-going vessels of all kinds are capable of transporting ten such army corps. The facilities for getting the vessels ready for war purposes would appear about equal. But when ready we have no modern guns with which to arm ours, while the Canadians will have at their command all of the vast resources of England in marine warlike stores, guns, carriages and equipments of all kinds. With a secure base in the strong and well-fortified harbor of Kingston from which to operate, and with the power of England to aid her, Canada possesses immeasurably greater "facilities for obtaining and maintaining supremacy in the event of war," at least upon lakes Ontario and Erie, than any at present, or soon likely to be, within the power of the United States.

The possession of such facilities by Canada will, however, avail nothing, unless she also possesses the power of defending them. She must have at her command a force strong enough for the defense of the St. Lawrence system of canals and the Welland Canal for a sufficient time to enable the English gunboats to pass through them, and also, if possible, to secure possession of Detroit and the river, and thus gain access to the upper lakes.

This necessitates the consideration of the

MILITARY FORCES OF THE DOMINION OF CANADA.

Naval.—The naval forces comprise eight armed screw steamers, and two additional ones employed on coast service, but not armed, these and the navy of England.

The census report of 1881 gives the number of mariners as 46,394 men, while the shipping returns for 1877 give the number of men connected with the mercantile marine as 16,000, and of those employed in the fisheries as 53,000.

Military.—The consolidated Militia Act of 1883, 46 Victoria, Chapter II., vests the command-in-chief of all military forces in the Queen personally, or in the Governor as her representative.

Art. 4. The Militia shall consist of all the male inhabitants of Canada, of the age of eighteen years and upwards, and under sixty, not exempted or disqualified by law, and being British subjects by birth or naturalization ; but Her Majesty may require all the male inhabitants of the Dominion, capable of bearing arms, to serve in case of *Levée en Masse*.

Art. 5. The male population so liable to serve in the Militia shall be divided into four classes :

The first shall comprise those of the age of eighteen years and upwards, but under thirty years, who are unmarried, or widowers without children ;

The second class shall comprise those of the age of thirty years and upwards, but under forty-five years, who are unmarried or widowers without children ;

The third class shall comprise those of the age of eighteen years and upwards, but under forty-five years, who are married or widowers with children ;

The fourth class shall comprise those of the age of forty-five years and upwards, but under sixty years.

And the above shall be the order in which the male population shall be called upon to serve.

Art. 60. The Officer commanding any Military District or Division, or the Officer commanding any Corps of Active Militia, may, upon any sudden emergency of invasion or insurrection, or imminent danger of either, call out the whole or any part of the Militia within his command, until the pleasure of Her Majesty is known ; and the Militia so called out by the Commanding Officer shall immediately obey all such orders as he may give, and march to such place within or without the District or Division as he may direct.

Art. 61. Her Majesty may call out the Militia or any part thereof, for active service either within or without the Dominion, at any time, when it appears advisable so to do by reason of war, invasion or insurrection, or danger of any of them ; and the Militiamen, when so called out for actual service, shall continue to serve for at least one year from the date of their being called out for actual service, if required to do so, or for any longer period Her Majesty may appoint.

Art. 62. In time of war no man shall be required to serve in the field continuously for a longer period than one year ; but any man who volunteers to serve for the war or for any longer period than one year, shall be compelled to fulfill his engagement. and Her Majesty may in case of unavoidable necessity (of which necessity Her Majesty shall be the sole judge), call upon any Militiaman to continue to serve beyond his one year's service in the field, for any period not exceeding six months.

Art 63. Whenever the Militia or any part, or Corps thereof, shall be called out for active service, the officers and men so called out shall be paid at such rates of daily pay as are paid to Officers, and men of the relative and corresponding grade in Her Majesty's service, or such other rates as may, for the time being, be fixed by the Governor in Council.

The sections of this act, numbering 100 in all, form a complete system of military law for the government of the militia in peace ; and in war bring it under the laws and regulations of the English army.

The Dominion is divided into 12 military districts, each under the command of a competent officer, who is provided with the necessary staff. These districts are subdivided into the regi-

mental and company districts, each having its commanding officer and staff, who must prepare yearly the muster rolls of all of the militia within their respective districts, with their proper classification, etc., retaining one copy and forwarding the other to higher authority. This law is based upon the well-known principles upon which the Germans have developed such startling success in the mobilization and recruitment of an army in time of war, viz.; the division of the country into geographical military districts; the localization of the different commands, with complete rolls of every available man in every company district, giving the exact status as to the class to which he belongs, etc.; and universal liability to military service in time of war.

In case of war the most important features of this act are embodied in articles 60 and 61, and the potency of the power therein given to the Sovereign, and her officers, down to the commander of a military district or division; "*upon any sudden emergency of invasion or insurrection, or imminent danger of either, to call out the whole or any part of the Militia within his command;*" cannot be overestimated. Article 61 gives the power to call out every able-bodied man in the Dominion available for military purposes, for active service "*within or without the Dominion,*" and to hold him, in case of emergency, for not less than a year and a half.

Should disputes arise with this country during a period of "hard times" in the Dominion, the fact that England becomes the paymaster in time of war might greatly increase the danger of a rupture. This fact, coupled with the utterly defenseless condition of our cities, and of the vast mercantile marine which would easily fall a prize to England in case of sudden war in our present condition, might precipitate a disastrous war upon us at a moment's warning; for if any war comes for which we are not adequately prepared, it is as certain as fate that it will be at England's time and declaration, and not at our own.

The present military organization for the defense of the Dominion has been drawn up by accomplished officers of the English army, who have carefully studied the requirements of the situation and the measure of the military resources. It forms a complete framework upon which to build an army, complete in all of its parts; provided with all of the necessary administrative machinery to put it into working order in the short-

est time required by the character of the material. The fact that all of the officers and non-commissioned officers, who at present possess at least some military knowledge and experience, can be named by the military authorities without a moment's delay ; and that complete rolls exist of the men who are to complete the organization ; and that the power is given to order them out on the instant ; are all of the greatest consequence.

What provisions have been made for a war organization of the military resources at command we do not know, but we are well enough acquainted with the organization of the English army, its traditions and the opinion of English officers, to be able to make a very shrewd guess as to what may be expected ; especially when taken in connection with the strength of the first class of this militia, and with the character of the organization which we are certain to adopt in the event of war.

The official report of the Adjutant-General of the Dominion of Canada, for the year 1885-86, informs us that the active militia of the Dominion then consisted of 747 companies, batteries, or troops, containing 37,346 men. It also gives in detail the military districts, with the organizations assigned to each. Were these organizations filled to the full war strength of similar English organizations they would include a total of 118,075 men.

Military Aptitude of the Canadians.—The last census gives the total male population of the Dominion in April, 1881, as 2,188,854. The average yearly increase of the same during the previous decade was about two per cent. per annum, or a little more. Taking this as the rate of increase since 1881, the Canadian Militia in April, 1887, numbered 1,146,201 of all classes, with 830,592 men available for soldiers in war.

The military aptitude of the Canadian people, or their general fitness for admission into military service, cannot be ascertained from any available statistics ; but it may reasonably be assumed to be about the same as that of the people of the Northern States of the Union in the War of the Rebellion. The age for military service with us was from 18 to 44 years, both inclusive, and the military aptitude of this class of men was calculated in the Provost Marshal-General's office to have been 760.3.* This rate applied to the last census returns of the

* In Europe the number used to express military aptitude denotes the number in the thousand of young men of twenty years of age who are found fit for the army;

United States (1880) would give 15.4 per cent. of the total population as available for war, or 7,768,811 men. The rates which have been assumed in computing the following tables give 18.8 per cent. of the total population as available; the increase being due to the fact that the limit of age for the Canadians is sixty instead of forty-five years.

In determining the available military force for service as soldiers, all of the mariners are deducted, and the military aptitude of the first three classes is taken as 760, and of the fourth class at 740.

Province.	1st Class.	2d Class.	3d Class.	4th Class.	Totals
Ontario.....	144,497	43,250	126,130	82,627	396,504
Quebec.....	86,492	27,764	91,086	52,015	257,357
New Brunswick.....	16,423	7,833	18,036	12,664	54,956
Nova Scotia.....	25,591	9,272	19,838	13,934	68,635
Manitoba.....	7,214	2,598	5,143	2,237	17,192
British Columbia... .	3,283	3,722	2,824	3,225	13,054
Prince Edward Island...	7,895	2,443	5,863	3,982	20,183
Territories	916	500	909	386	2711
Totals.....	292,311	97,382	269,829	171,078	830,592
Mariners. . . . .	....	....	....	....	46,394
Grand Total	292,311	97,382	269,829	171,078	876,986

The numbers here given are not strictly accurate, for the census returns do not give the data necessary to determine the number in the first and second classes of "widowers without children," nor in the third class the number of "widowers with children." This, however, will cause but a very slight variation in the number given for these classes, while the total will not be affected at all. It may here be remarked that the Germans claim to have brought under arms during their last war, seven-eighths of their available men. Were the Canadians to accomplish a like result in war, they would be able to bring under arms in 1887, 726,768 soldiers, and 40,593 mariners, a total of

and this expression generally has a value much less than that given above for the United States, for the reason that it simply shows the number per thousand who usually enter service, while with us it represents the actual number per thousand who are fit for service whether they enter or not; the military aptitude of the country being the rate of availability for military service as derived from all its male citizens within the military age.

767,361 men. But to do this will, of course, necessitate drawing from all of the different classes of the militia up to sixty years of age. The Germans counted as available only the men who were actually in the army, or who had received their military training so recently as not to have passed out of the different reserves; while the Canadians, like ourselves, must depend upon the availability of the entire body of citizens of military age and fit for duty, numbering 830,592 men for the army, and 46,394 mariners.

It is evident that the present organization of the Dominion Militia cannot properly utilize the force available in case of war. As heretofore stated, we do not know what shape this organization will take to secure such an end, but it will surely be such a one as will absorb the first class of young unmarried men for their first line. There is quite a large number of trained officers in her active militia, and in Great Britain there are over 7000 officers, a large number of whom would seek, and be given, commands in the Dominion forces in the event of war. There are in the Indian army nearly 7000 English officers; added to these, there yet remain in England many thousands of highly educated and competent officers of the volunteers and militia. When the militia is called into the service and pay of the Empire, the Queen will undoubtedly appoint all of the general officers and colonels, and very likely all of the lieutenant-colonels or battalion commanders, from among the highly trained and most competent officers of the Regular army. Such a measure would be the wisest possible, and would prove of incalculable value in the rapid and proper development of the Canadian military power, and of its proper application in time of war.

It is probable that the general features of the English organization would be followed by the Canadian authorities in everything except that of infantry, which, in view of what it would have to meet in our Army, will no doubt be given a regimental organization of twelve companies of three battalions, with a fourth battalion for the depot. This last will collect and train the new levies from which the field battalions draw their recruits, and will aid in the local defense from any sudden attack. The present territorial organization points directly to such a tactical one, and was no doubt adopted for the purpose, and there can be little doubt that this most valuable feature of organization of the war-

wise Germans will be applied in the event of war as being the best possible.

Any increase in the strength of the present organization will leave a deficiency in cavalry and field artillery which cannot be secured in any system of militia however perfect, on account of the cost and the time required to secure any reasonable degree of efficiency. These will have to be made good from England. The English cavalry consists of 31 regiments, mostly serving in Great Britain, but there will not be need for large numbers of this arm. There are in the Royal Regiment of Artillery 205 batteries; of these, 31 are horse batteries, and 83 field batteries, most of which serve in Great Britain, and can readily be brought to Canada; leaving their horses, if necessary, to mount other batteries in England, but bringing all of their armament and equipments, and finding plenty of good horses upon their arrival in Canada. It would require 18 field and 24 horse batteries to be added to the present organization to make it complete as hereafter indicated; and this number, and of the best, could be brought over in a very short time.

For the transportation of war material, stores, etc., besides the means for water transportation, and by ordinary roads, the Canadian railway system comprises 11,970 miles of track; 1524 engines; 1252 passenger, 403 baggage, mail and express, and 38,313 freight cars.

In order to indicate clearly in a military form the possibilities of the Canadian organization and war strength, we may suppose the mobilization of their organization changed as indicated, the present battalions representing regiments in war, exactly as they generally do in the English army.

The result would be as follows:

Regiment of Artillery, 24 horse batteries.....	4,608
“ “ “ 36 field “ (+ 18)*.....	7,344
“ “ “ 3 garrison “ (+ 44)*.....	480
Total.....	12,432

ONTARIO.

1st Military District.

1 Regiment cavalry.....	1,200	3 Field batteries.....	612
12 “ infantry.....	19,920	1 Garrison battery.....	160
Total.....			21,892

* Not counted here but in the subsequent enumeration.

2d Military District.

2 Regiments cavalry.....	2,400	1 Battalion infantry.....	555
1 Battalion ".....	400	7 Field batteries.....	816
15 Regiments infantry.....	24,900	2 Garrison ".....	320
		Total.....	29,391

3d Military District.

2 Regiments cavalry.....	2,400	2 Field batteries.....	408
" infantry.....	14,940	1 Garrison battery.....	160
		Total.....	17,908

4th Military District.

2 Battalions cavalry.....	800	2 Field batteries.....	408
7 Regiments infantry.....	11,620	1 Garrison battery.....	160
		Total.....	12,988

Ontario, grand total..... 82,179

QUEBEC.

5th Military District.

2 Regiments cavalry.....	2,400	3 Field batteries.....	612
13 " infantry.....	21,580	7 Garrison ".....	1,120
1 " engineers.....	2,782		
		Total.....	28,320

6th Military District.

8 Regiments infantry.....	13,280
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7th Military District.

1 Regiment cavalry.....	1,200	1 Field battery.....	204
12 " infantry.....	19,920	6 Garrison batteries.....	960
		Total.....	22,284

Quebec, grand total..... 64,058

NEW BRUNSWICK.

8th Military District.

1 Regiment cavalry.....	1,200	1 Battalion engineers.....	923
5 " infantry.....	8,300	2 Field batteries.....	408
1 Battalion ".....	555	5 garrison ".....	800

New Brunswick, grand total.... 12,186

NOVA SCOTIA.

9th Military District.

1 Battalion cavalry.....	400	1 Field battery.....	204
9 Regiments infantry.....	14,940	12 Garrison batteries....	1,920

Nova Scotia, grand total..... 17,464

MANITOBA.

10th Military District.

1 Battalion cavalry.....	400	1 Field artillery.....	204
2 Regiments infantry ...	3,320		
		Manitoba, grand total.....	3,924

BRITISH COLUMBIA.

11th Military District.

2 Regiments infantry.....	3,320	4 Garrison batteries.....	640
		British Columbia, grand total....	3,960

PRINCE EDWARD ISLAND.

12th Military District.

1 Regiment infantry.....	1,660	5 Garrison batteries.....	800
1 Engineer company.....	239		
		Prince Edward Island, grand total....	2,699
		Dominion, grand total.....	198,788
		Non-combatants, 6 per cent.....	11,927
		First line.....	210,715
		Dépôt battalions, batteries, troops, etc.....	62,428
			272,963

The first class numbers 292,311 men, and there would consequently remain after this organization has been completed, 19,348 men, and these, together with the men in the dépôt battalions, would supply about four drafts of 10 per cent. each to the field army; it being now a well-established principle that as soon as any field organization loses 10 per cent. of its maximum strength, this deficiency must immediately be made good from the dépôt battalions, they being in time filled up again from the next line, or reserve.

The object, however, is to utilize not only all of the men in the 1st class but those in the 2d class also, the latter forming the Second Line. The 2d class numbers 97,382 available men, and these, with the remainder of the 1st class, give a total of 116,730 men. There are ninety-five dépôt battalions and two *reserve* battalions in each regimental division. These latter would require 105,450 men, and would very nearly absorb the 2d class, there being a surplus of but 11,280 men.

The dépôt battalions number	62,248 men.
Two reserve battalions	105,450 "
Total strength of the Second Line.....	167,698 "
Total in both Lines.....	378 413 "

The third class, 269,829, and the fourth class, 171,070, total 440,899, effectives, yet remain untouched, and a third line can readily be ordered at any time, giving, say 157,700 men, with over 280,000 effectives not yet called out.

RECAPITULATION.

Engineers.

1 regiment.....	2,782
1 battalion	923
1 company	239

Regiments Artillery.

24 horse batteries ...	4,608
36 field batteries (+18).....	7,344
47 garrison batteries.....	7,520(3,762)

Cavalry.

9 regiments	10,800
5 battalions.....	2,000

Infantry.

95 regiments.....	157,700
2 battalions	1,110
Non-Combatants 6 per cent.....	11,927

First Line.....210,715.468 guns.

Dépôt Battalions, Batteries, etc.

Engineers ; 1 battalion.....	923
Artillery ; 10 batteries.....	2,040
Cavalry ; 10 "	4,000
Infantry ; 95 "	52,725
	62,248

Landwehr.

Infantry ; 190 battalions	105,450
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Second Line.....167,698.60 guns

Reserve.

Infantry ; 95 regiments.....	157,700
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Third Line.157,700

Grand Total.....536,113.528 guns

When the Landwehr is called out, add non-combatants.....	10,062
and with the reserve.....	9,460

19,522

Aggregate.....555,635

We know that the military system is, and in case of war will continue to be, under the control of professional and highly trained soldiers. The key to the system on which the forces will be organized for war is plainly given, and we can thus judge with a reasonable degree of certainty as to how the details will be worked out. At any rate, we may be well assured that whatever organization may be authorized, its details for the time being are now perfected for each and every subdivision of each military district; with the list of officers, etc., completed, and revised from time to time. When war comes, there will be no question of enacting laws to provide the organization, and of procuring arms and equipments from we know not where. Notice will be sent to each headquarters to fill up the commands already organized, the officers selected will be notified; the necessary number from each class called out; all of the arms and equipments will at once be sent from England, if indeed, this has not already been done in anticipation of war; and, in a time so short that we will not be able to realize it, this organization will be converted into an actual army, and, as we might possibly find to our cost, an active army.

That the magnificent results obtained by the Germans in this direction, will or can be even closely approached, is not to be expected. But the power and ability exists for securing results such as we cannot possibly expect in the United States, under our present crude systems and laws, and especially will this be so if the Canadians are to have at their free disposal, all of the mighty military resources of England, while her fleets shut us off from the rest of the world, and limit us to our own undeveloped resources.

The military force of England must also be included in every calculation respecting our operations against Canada.

Regular Army.	200,000
Reserves and Auxiliaries	346,651
Mariners, etc.	127,449
Total	<hr/> 674,090

Armament.—There are on hand in the Dominion 748 guns of all descriptions, from Gatling guns up to and including 7-inch breech-loading wrought-iron guns, and a few 12-inch rifles and other navy guns; also 70,000 Snyder rifles, 40,000 being in the hands of the troops. There are also 2000 Winchester rifles, and

a considerable number of other arms and equipments for cavalry. The field artillery is armed with the M. L. 16 pdr., the equipment being complete in guns, carriages, harness, etc.

In case of war, England would of course quickly furnish all the armament necessary. Her military policy requires not less than 600,000 stand of approved arms to be kept in store or packed ready for shipment to any part of the world. Seventy-five thousand stand of arms, together with 100 rounds for each rifle, will weigh about 1000 tons. These can be loaded upon one of the powerful and swift English steamers within thirty hours; and seven days more would bring the vessel to the wharf in Quebec. Within ten days from the date of notification, therefore, the arms and ammunition would be at Toronto, London, or the Welland Canal for distribution to the troops, in place of the Snyder rifles. A single vessel could readily carry 150,000 rifles, etc., and four of them a full supply for the maximum force indicated.

V. THE BEST MODE OF CONDUCTING OPERATIONS ALONG THE ENTIRE LINE, AFTER THE OUTBREAK OF HOSTILITIES.

There is a trite old saying that "history continually repeats itself," and before entering upon the discussion of this feature of the subject, it may be well to review briefly the history which may be expected to repeat itself in this case.

At the time of the conquest of Canada in 1758-60, the population of the British Colonies was twenty times as great as that of Canada (at present that of the United States is about twelve times as great) the latter having for her only aid the gallant Montcalm and his little army of less than 5000 Frenchmen. She was cut off from France by the navy of England, then as now mistress of the seas, whose power was then wielded with that of the Colonies to invade Canada. Under Abercrombie 9024 provincials assembled on the shores of Lake George, and by their side were the tents of the Regular army, numbering 6367 men. On July 5, 1758, this armament of more than 15,000 men, the largest body of European origin that had ever assembled in America, broke camp and moved against Montcalm's forces, amounting to 2800 French and 450 Canadians, to which de Levi had joined himself with 400 chosen men. On the 6th of July the English and Americans attacked, lost 1967 in killed and wounded (chiefly Regulars of course), and then fled in confusion.

Bradstreet, with 2700 men, started for Fort Fontenac, crossed

Lake Ontario in open boats, and landed on the 25th of August within a mile of that fort. The fort was razed, and the expedition returned to Lake George.

1759. The census of Canada showed a population of but 82,600 souls, of whom not more than 7000 men could serve as soldiers. The eight French battalions counted but 3300 men, and but scant supplies had been received from France. There was great scarcity in the land. The fields were hardly cultivated; the domestic animals were failing; the soldiers were unpaid; paper money had increased to 30,000,000 livres, and would that year be increased twenty millions more. The English had almost 50,000 men under arms, of whom, including the Royal Americans, 22,000 were Regulars. Added to these were the fleet of England; an armed force nearly equal in numbers to every man, woman and child in Canada.

In July Prideaux, with a large force, defeated D'Aubray's 1200 men, and Fort Niagara was taken. De Levi left Quebec and occupied the passes of the St. Lawrence at Ogdensburg with a small force.

Amherst assembled his main army at Lake George, and in five British regiments with the Royal Americans, he had 5743 Regulars. Of provincials, including Gage's light infantry, he had over 10,000 more. Fort Carrillon, garrisoned by 400 men, was taken, and the French abandoned Ticonderoga, and retreated from Crown Point to intrench themselves at Isle-aux-Noix.

The capture of Louisburg was a ray of light through dark clouds.

After this event Wolfe had 8000 Regulars. The fleet under Saunders included 22 ships of the line, and as many frigates and armed vessels, with over 20,000 sailors and marines. In June the whole armament arrived off the Isle of Orleans. In September, 1759, the armies met upon the heights of Abraham. Wolfe's army was composed of well-equipped Regulars. Montcalm's of six wasted battalions of Regular troops, and the Canadian militia, "boys of 15 to old men of 70." The result was inevitable, and Quebec fell.

In 1760 Amherst had nothing of consequence to oppose him and he led an army of 10,000 men, mostly Americans, toward Montreal; passed down the river without opposition, and on September 8th the cross of St. George floated over the gates of Montreal, an open town, of a few hundred inhabitants.

Canada had fallen, but it had taken 50,000 armed English, with nearly 30,000 sailors and marines, nearly three years to conquer a half starved population of less than 100,000 French, aided by eight battalions of Regulars, less than 5000 strong.

War of 1812.—During this War Canada had the aid of England, but that nation was obliged to pay far more attention to Napoleon than to all else besides, and on that account, no doubt tacitly abandoned her war with us just before the final great struggle at Waterloo. But she did not do even this, until we agreed to terms which reflect no credit upon this nation, after the stand taken at the commencement of the War.

The Declaration of War.—June 3, 1812, the President sent his message to Congress, declaring war, and that body commenced to "debate," and kept this up until the 18th, when the act declaring war was finally passed. A repetition of this kind of history would probably find English fleets in our harbors awaiting the declaration of war. On the other hand, should England determine to declare war, as she undoubtedly will if one becomes inevitable, she would, in our present condition, send her fleets to do it, and accompany such declaration with instant assault.

The military history of this War is not pleasant reading. There were in the Army at one time or another while it lasted 15,605 officers and 220,206 men, or a total of 235,811 men. Of this number there were 1877 killed and 3737 wounded, a total of 5614

Our people now know enough about war to be capable of judging of what kind of warfare this list of killed and wounded is a measure. At the battle of Stone River the Union Army, numbering 43,400 men, lost in killed and wounded 8777. General Bragg reported his strength at 35,000 men, and his loss in killed and wounded at over 9000; a total in this one battle, out of 78,400 engaged, of over 17,000 killed and wounded.

It is needless to say that Canada was not subdued during this War. Fortunately for us, England had her hands full elsewhere. It was with the greatest difficulty upon our part that men could be secured for the Army, and active operations prosecuted. The desertions from the Army were simply frightful in number. The exact number cannot be ascertained, but probably exceeded fifty per cent. of the total strength of the Army.

The War with Mexico was a brilliant success for the Army, but even in the face of the rapid and decided success, there was, as

has always been the case, a powerful party in the country utterly opposed to the War and its prosecution.

Within our own times we have witnessed the greatest of all our wars. At its inception both parties were unprepared, the South indeed having to organize everything even from the government down;—having to create everything, while we had not only the advantage of numbers, but of an organized government, and all that it implies; with the markets of the world open to us for obtaining supplies. This War was waged with a leisure utterly inconsistent with modern practice, a condition which cannot obtain when the enemy possesses even ordinary preparation.

The population of the North was 19,614,885 freemen and 88,986 slaves; that of the South 7,570,224 freemen and 3,860,571 slaves, and, not counting the border States and West Virginia, the War was actually waged by only about 5,500,000 whites. During the War 2,259,209 men were called out by the North, of whom 186,097 were colored, and of these 1,000,000 were under arms at the close of the War. It was found that the average available strength of the Army in the field was 693 men per 1000 of the aggregate.

Even the dumbest intellect recognized the fact that this was a war waged to maintain the very life of the Nation, and one calculated to arouse to its highest pitch the spirit of patriotism. Nevertheless, there existed to an alarming extent the historical opposition to the maintenance and continuation of the War.

In case of a war with England for the acquisition of Canada, or for defense against oppression, we could not count upon even the enthusiasm which was then engendered both North and South. Such a war could not be for union, nor would union prevail. As usual, one great political party would oppose it, and, in the event of want of success on our part, would probably acquire possession of the Government, and terminate the war after the manner of that of 1812.

Suppose that the South had been favored by the natural strength of a frontier like that of Canada instead of being weakened by the open one she had to defend. Would the North then have found it an easy matter to invade her soil? Suppose she had had in addition the active aid of England's navy and army, and the mighty resources of her arsenals and dock-yards. She could then have shut up our ports, prevented

our obtaining supplies, ruined our commerce and business, while her ports would have been open to all the world, her soldiers supplied with arms and equipments at the shortest notice and to any desired extent. Fifty or a hundred thousand English Regular soldiers would, if necessary, have aided her in the field, and a fleet of gunboats would have attacked the North along the whole exposed lake frontier. Under such conditions how many years would the war have lasted before being brought to a successful issue? Yet this would, in our present unprepared condition, be just about what we would have to look forward to were we to attack Canada. In the present case we should, it is true, have both North and South together, but a mere suggestion of greater numbers would not add much to our strength.

When the utter defenselessness of the country is pointed out, attention is at once called to the fact that we possess "hundreds of thousands of veterans, trained upon scores of battle-fields, whose equals are scarcely to be found in the annals of war." That was rather an important fact to call to the attention of Napoleon III. twenty years ago, but it is getting to be rather too old now. At the close of the War of the Rebellion, the average age of the men in the Army was over twenty-five years, It is now over forty-five, the limit of age for military service in this country.

The status of this reliance in case of war is best illustrated as follows:

Total number of soldiers.....	2,259,209	
Killed in action, died, etc.....	313,000	
Died since close of the war....	736,994	
On pension rolls.....	292,000	
Applied for pensions.....	338,000	
Deserted during the war.....	508,494	
	<hr/>	
Total ineffectives.....	2,188,488	2,188,488
		<hr/>
Total effectives, 1887.....		70,721

It is needless to say that few of these are now within the limits of military age, or are fit for further military service, which must be confined to a younger generation.

It is true that many of the deserters from the Army during the last war are still living, which fact will somewhat modify the above statement, but dead or alive they are not to be depended

upon under any circumstances. The number of deserters given above is, no doubt, in excess of the actual number of intentional deserters, but such is the recorded number in the War Department. It demonstrates the humiliating fact that among that grand army of freemen who were engaged in the defense of a most sacred principle, more than one-fourth deemed it no disgrace to desert their flag and nation in the hour of greatest need.

The record of the War of 1812 presents a yet more shameful one than this.

These facts are not commonly known, or are put out of sight in discussing the possibilities of a future war. But to the trained and educated soldier they are matters of the most vital importance. He must carefully calculate and weigh every element in the chance of war, and if the past history of our own country demonstrates the fact that the reduction in the numbers of our Army will be greater from desertion than from deaths, wounds and disease, most certainly this fact is one for the gravest consideration. Coupled with this is another fact. Of this vast army 776,829, or one-third of the entire army, had to be *drafted* to insure their patriotic services; and many hundreds of thousands more were only tempted to give their sadly perilled country the benefit of their services by the most extravagant system of bounties of which we have record.

These facts are of the utmost significance, as tending to show that in a great and prolonged war, dependence cannot be placed upon the system of volunteer soldiers alone for obtaining all of the men that the necessities of the country may demand. Wise laws must be framed to meet these emergencies; especially to prevent the enormous loss from desertion, which has been so shamefully prevalent in all of our wars.

The strength of the forces needed in case of war cannot readily be ascertained, as the different factors of the problem are too indeterminate. Any estimate that will give, with some degree of accuracy, the numbers that will be found necessary, will no doubt be received with incredulity, as was that of General Sherman's in October, 1861, "that it would require 200,000 men to carry on the War in the Kentucky theatre of operations." For making it he was denounced, and deemed crazy, insane, mad. Nevertheless, on the 10th day of April, 1864, there was in that same theatre of war an aggregate strength of 352,265

men, and there does not seem to have been any too many, either.

At the battle of Gravelotte the Germans numbered 2.1 men to each French soldier, and the battle itself was not a success of the most decided kind.

Of course it is well understood that successful strategy will bring a preponderating force to bear at the decisive point, even when the total numbers of combatants are equal. But it is also a well-recognized fact that, other things being equal, the offensive invading army must be at least one-half stronger in number than the defensive one, and this proportion of necessity must increase as the line of invasion is lengthened. The basis of any calculation then will be the strength and character of the forces that the enemy will bring into the field, as well as the nature of the war, and of its theatre. If the Canadians can bring into the field, in case of great emergency, the numbers heretofore indicated—and there seems little reason to doubt their ability to do so—at least for the five months in the year when campaigning is possible), when England furnishes the arms, equipments, pay, etc., we will have to meet in their first line 210,715 men, with 316,072 on our part. When the second line is called out, 388,413 with 582,619 men. And when the third line is also called out to repel invasion 555,635, with 833,442 men in our armies. And this without taking into consideration the necessity of increased force for the protection of our lengthened lines of communications and our extended and defenseless sea-coast, or the fact that forces may arrive from England or elsewhere.

If it were deemed advisable to call out such a force as this, advantage might be taken of the political division of the country into Congressional districts. Of these there are 325, with 8 Territories, each containing about 23,000 men, available for military service. One 12-company regiment from each—(30, say, being cavalry, and 20 engineers and artillery, with 100 men to a troop of cavalry, and 150 to a company)—would furnish a force of :

Infantry, 283 regiments	509,400
Cavalry, 30 “	36,000
Engineers, 5 “	9,000
Heavy Artillery, 15 regiments.....	27,000
Field Artillery (3 guns per 1000 men) 300 batteries.....	45,000

Total Volunteers 626,400

Regular Infantry, 25 regiments.....	45,000
Cavalry, 10 regiments.....	12,000
Engineers, 5 companies.....	750
Artillery, 5 regiments.....	9,000
Total Regulars.....	66,750
Non-Combatants, 6 per cent.....	40,000
Reserve Companies 335 at 250 each.....	83,750
Grand Total.....	816,900

It is needless to say that every officer should have rank and pay commensurate with his command. The "laborer is worthy of his hire," especially in the field, in time of war. No greater absurdity can exist in an army, nor one more calculated to weaken the authority of officers in high command, than to have several of the same grade; one commanding a division, another half a dozen divisions, another half a dozen army corps, and still another half a dozen armies, as was the case during our prolonged War. Perhaps commissions by brevet would serve the purpose, the officer exercising command, etc., upon assignment by the President.

As has already been stated, the experiences of our last War demonstrated the fact that the average available strength of the Army in the field was 693 men per 1000 of the aggregate; hence to bring the forces here indicated to bear against the enemy, will if organized and recruited under the old system, necessitate an aggregate strength of 1,202, 604 men for the attack of Canada alone; while the enemy, at home, for the few months required for active service in emergency, and under their system, will present very nearly their maximum strength.

In developing the military strength of the nation, recourse would be had to volunteers, enlisted for the war, upon special conditions as to pay, etc., as defined by law. But that most pernicious and vicious system of organizing new regiments, whenever the strength of those at the front becomes too weak, should never again be permitted; even though we have to resort at once to the draft to keep the organizations in the field complete in numbers. If the strength of the Army with all regiments filled is not sufficient, then of course new regiments must be raised. Unless due care be exercised in this respect, and wise laws enacted, and rigidly enforced respecting desertion, any war will cost in money alone, not less than twenty-five per cent. more than it ought, and much more in the loss of efficiency.

A thousand men drafted into an old regiment at the front, which is already provided with officers, non-commissioned officers, and some men already trained and experienced in actual war, are worth two or three times their number sent forward in the shape of new regiments. Even when an increase of the Army becomes necessary, it would be better to increase the strength of the organizations already existing. The officers will then have become more competent to command the increased numbers than they were the original numbers at the beginning of the war.

The essence of the territorial system with us would be restricted to the regimental district and to its subdivisions. A dépôt battalion would not perhaps serve the double purpose of a dépôt and school for recruits, and also a force for the field in case of emergency; but for the former purposes only. In each State a sufficient number of companies should be organized at one or more places to receive and train all of the recruits necessary to keep the field force up to the maximum. This would be found less costly, and much more efficient than to have dépôt battalions, or even companies for each regiment scattered over the State.

The regiments should be United States Volunteers, with professional soldiers for field and general officers, since those of the Canadian forces would unquestionably be appointed by Her Majesty from among the best officers of her Regular army. This would be a measure of inestimable value to such forces; worth more than an army with banners.

Regimental districts to furnish all men for the regiment is the rule in Europe, but is found to distribute the burdens of war, especially of loss in battle—unequally. It would be better to draw the recruits equally from the regimental districts, and then to let each recruit join the regiment from his own district so far as is possible, any deficiency to be made up by a general draft from the whole body of recruits. When the draft must be resorted to, which will soon be the case in such a war, individuals may be permitted to furnish substitutes, but should be held responsible for them in case of desertion; just as each regimental district must be held in like manner responsible for the men it furnishes.

Of course in an extreme case there would have to be obligatory service and no substitutes.

It would no doubt be a wise measure to divide the men from 18 to 45 years of age into two classes; the first class comprised

of those men who are unmarried, or widowers without children, and the second class embracing all the others within the military age : with of course the ordinary provisions for exemption.

This all indicates expenditure of money, and means increased taxation, and people would at once begin to ask, What will it cost ? Will it pay ?

The revenue for 1885 was \$323,690,706, and of this amount \$181,471,999 was derived from customs. In case of war with England in our present situation, this source of revenue would at once be extinguished, leaving only \$142,218,707, hardly half the current expenses of the Government. It would at once be discovered that the ability of the Government to borrow money at three per cent. with an overflowing treasury and so large a surplus of revenue that it was bothered to find a way to spend it, would suddenly cease when war brought about the annihilation of the customs receipts, and the need to borrow money by the thousand millions.

For the same year our imports amounted to \$577,527,329, and the exports to \$742,189,755, a total foreign business of \$1,319,717,084. War would put a stop to this enormous business at a blow, and the financial ruin it would cause surpasses calculation, and its effects reach every hamlet in the land. It is asserted that the effect must be as disastrous to England as to us, but not so. She will be at liberty to turn her interrupted trade into other channels, while we shall be completely bottled up.

This would be Russia's opportunity, who has been so often mentioned as likely to come to our aid.

She would seize so favorable an opportunity to build up her finances, to increase the prosperity of her empire and to put money into her pocket by stepping quickly into the vast grain, petroleum and other valuable trades which we should lose.

The fish-bone of contention would be at rest for a time ; our fishermen not caring to approach even the three-mile limit.

Men would be thrown out of employment by the hundred thousands, and business disorganized and ruined in every direction. In fact, it would at once become apparent that going to war with a nation capable of blockading our ports, or of seizing the great centres of our commerce and finance, was quite a different thing from our last War ; when we closed the ports of our enemy, while our own remained open to the commerce of all the

world, with every market open to us for the purchase of war material. Instead of having for an enemy a people thus shut up, who had to perfect their organizations, even from the very foundation of their government, we would have to meet one vastly better prepared for war than ourselves, and the consequences would at once become apparent, and by no means to our advantage.

These are some of the facts revealed by an inspection of our past history and present situation. They do not appear to point out "the best mode of conducting operations along the entire line *after* the outbreak of hostilities," nor yet to any satisfactory mode of so conducting them along any part of this line. It must be apparent to even the most obtuse mind that some adequate preparation must be made before such an outbreak, to insure any adequate measure of success, even for the successful defense of our northern frontier from the assaults of the enemy.

The limits of this paper will not admit of a discussion of what the mode of conducting operations should be. That it should comply with the well-defined and recognized methods of war, goes without saying. There would be required a retaining force on the eastern frontier of Maine. It will be of the utmost importance that a garrison of greater strength than a single ordnance sergeant be furnished Fort Montgomery, if peradventure a sufficient one can be thrown into that place before the enemy gets possession. It should never be without a sufficient garrison even for a single day. The Canadian 51st battalion at Hemingford, and the 60th at Clarenceville are both much nearer by rail, or common roads, to this fort than any of our military organizations. These battalions at present muster 688 well-armed and equipped men, and in case England declared war against us, could readily seize this undefended place, and thus open a passage for all their gunboats drawing less than seven feet of water, into Lake Champlain, and toward Albany, our great central base of operations.

The next point, and one of vital importance, is to secure the possession or destruction of the St. Lawrence canals, near Morrisburg. For, should the enemy hold possession of these for only the time necessary for the English gunboats to cross the ocean, it will assure the passage of a fleet of his war vessels into Lake Ontario. Our nearest force consists of the few companies at Sacket's Harbor, while the enemy will have available within

the immediate vicinity the 41st, 42d, 56th and 59th battalions, at present numbering 1280 men; and within a less distance than our forces, the 4th cavalry, 14th, 47th, 43d and 18th battalions and three field batteries, at present numbering 1848 men and 18 guns. This force of over 3000 men and 18 field guns, all nearer by rail to the scene of operations than any force we have within more than double the distance (except those mentioned) would, without the shadow of a doubt, seize the south bank of the river, and before we could dispatch a single armed man to the scene of operations, could secure such positions and intrench them to such a degree that nothing short of a considerable force of well-organized and armed troops could dislodge them. In fact, before we could transport any adequate force at all to this point, the Canadian battalions will have been filled up to their war strength of over 14,000 men, requiring 12,000 of the 30,000 arms in store.

The proper officers have no doubt selected the sites to be fortified, and have ready the plans of the earthworks necessary. Railway workmen and others with the necessary tools would be collected from every direction. Guns and carriages would be sent from Kingston and Montreal, with a brigade of garrison artillery from the latter place to serve them; and in a time so short that none can realize it, they will have established themselves in such a manner that nothing but a most resolute and determined attack by a large force, will be able to dislodge them. If this be not prevented within thirteen days, we must expect to see the English gunboats passing through the canals. This would seem to reveal a state of affairs upon our part, of startling gravity. But there is not the slightest doubt as to the ability of the Canadians to realize it with the greatest ease. And there is no more doubt but that the professional soldiers who perfected their organizations, their distribution, and that of their arms and military equipments and supplies, had just exactly this movement in view, and for the express purpose indicated. Well knowing that if they could only hold on for the thirteen days necessary to pass the English fleet into the lake, the full benefits to be expected will have been realized, and we will then be welcome to the place, if we can get it.

It is often suggested that parties of citizens might cross the river and destroy the locks of these canals. Such a thing is not at all probable from this sparsely settled part of New York, and

even if it were, when private citizens attempt to make public war in this manner, and are caught (which would almost certainly be the case), they are hung with an astonishing degree of promptness, quite discouraging to the advocates, and especially to the would-be participants of such warfare.

The next point of the frontier, and one of equally vital importance, is the Niagara River, and the Welland Canal. This canal, controlled by the Canadians, will enable them to pass any English war vessels that may gain access to the lower lake, up into Lake Erie; as well as any vessels they may be enabled to fit out in the well-fortified harbor and completely equipped dock-yards of Kingston.

The Welland Canal is entirely out of reach of guns from our shore. The nearest troops we have, are two companies at Fort Niagara, two more at Buffalo, with two regiments and a battery of militia at the latter place, in all 1300 men. The Canadians have the 44th battalion, 392 men, at Clifton, which would at once destroy all of the bridges at that point, and then join the field battery at Welland for the defense of the canal against any attack from Buffalo, the 19th battalion, 299 men, remaining at St. Catharine's for the defense of the locks. Within about 100 miles by rail of this canal, the Canadians have 25 battalions, 2 regiments of cavalry, 7 field, and 1 garrison battery, with a total present strength of over 9000 men, and 42 guns, completely armed and equipped, while we cannot muster an equal force within three times that distance. These organizations filled up to the war strength, will comprise a force of 30,000 men, requiring 18,000 more of the arms held in store, and when completely organized will number over 45,000 men. Had we a sufficient force at hand, and could suddenly assume the initiative, we might have some chance of securing possession of at least a part of the canal for a short time. But that part will be the upper one, where it will be the most difficult of destruction.

The Canadian railway system could not be more favorably situated than it is for the concentration of her troops for the defense of this canal. With the bridges over the Niagara River destroyed, to cross it in the face of the forces they can quickly muster, will be no slight military achievement for the most skillful general, and the best disciplined armies. To make a descent by water from the Ontario side might be precarious, from the danger of attack from such vessels as the enemy can fit out upon

that lake, and of those which may arrive from England before the enterprise might be completed. The attack promises better from Lake Erie, where we have the predominance in commercial marine, and where our forces, most interested in this particular enterprise, can best be mustered.

To make such a descent upon an enemy's shore even with a thoroughly organized and disciplined army, without the co-operation of a regular navy, would be no common feat. But this canal must be destroyed, or we must get possession of it, and that too without delay, otherwise 14 days steaming from England will bring the English gunboats into the waters of Lake Erie, and with these two lakes under command of their fleet, any attack upon the Province of Ontario by us, will be an exceedingly difficult and dangerous operation to carry to a successful issue.

If England declares war, doubtless an effort will be made to seize Detroit. In this event the gunboats will have been started for Montreal, and the arms shipped to the proper points in the Dominion in advance, and, although at this point, as elsewhere, we would soon be able to concentrate a large army of men, we could not get the necessary arms and equipments for them. It is possible that the enemy might be able under such circumstances, to get war vessels into Lake Huron, but our chances for preventing it are much better than in either of the other cases.

From here, westward, the question of military operations is simple enough, as the country presents no military objectives of importance, save perhaps the Canadian Pacific Railway, and the great wheat producing regions, to get possession of which will give us little trouble.

Upon the Pacific we should secure possession of Victoria, Esquimaux, and the terminus of the railway. But with a powerful English fleet to deal with, the operation will not be a simple one, although the population of British Columbia is insignificant.

The great objective point of first consideration is of course Montreal, which secured, affords a base for operations against Quebec. Albany is our national base, and from it the old war paths of the Iroquois as surely indicate the line of operation, as can the best modern strategist. Montreal is at the head of the sea navigation, and the commencement of all of the different inland navigations, natural and artificial. It is also seated astride the railway system of the Dominion, and with it in our hands,

we hold within our grasp the very life of the Dominion : and from it could securely operate against the divided fragments. That we will be permitted to occupy it without such a struggle as England is capable of maintaining when once in earnest, it is idle to suppose.

That it is an easy matter to underestimate the military powers of Canada, even when backed by the might of England, as well as to exaggerate greatly our own present or immediately prospective military power, we have ample cause for knowing at all times. At the same time it has been demonstrated by the history of all times and of all countries that there is no surer way of bringing about mortification, defeat, and even national disaster. Jomini has laid it down as a rule that no country capable of quickly putting a force of 100,000 armed men into the field, is to be invaded with impunity, except by overwhelming numbers. That wise old strategist possibly never conceived that a nation, situated as we are at present, could be idiotic enough to provoke to war such a power as England, much less think of invading her territory.

The nature of the frontier of Canada proper, coupled with that of the winter climate, renders an attack upon the Dominion anything but a simple task. When we also have to count upon the resistance of the powers of the British Empire, with all of our great seaboard cities utterly at the mercy of her fleet, without military organization, without arms or warlike supplies, and without the power of obtaining them in the event of war, save by the slow process of manufacture; without a navy, and with the prospect of all our ship-yards being in the hands of the enemy within a few days after a declaration of war; in fact, without a proper development of any of the most common and vitally necessary resources of war even for our own adequate defense, it is sheer idiocy for the people of the United States, or any part of them, to dream of engaging in a war with England in our present condition, or of giving her any just cause for making war upon us. If we so do, and in the face of it attempt to mend our present absurdly defenseless condition, she might strike without a moment's warning, and, if she followed up the blow with vigor, it might and probably would be a long time before we could do her any serious damage. Meanwhile, she could surely count upon that inevitable feature of our past history, the termination of any war in which we do not continually reap sub-

stantial advantages, by the opposition party, and the peace-at-any-price people.

It may be claimed that such a presentation of the case is too pessimistic, but the endeavor has been made to present the facts as they at present exist, or have existed in our past history, and any one is at liberty to pass judgment upon them. In so doing it should always be borne in mind that a government such as ours, is less adapted to the prosecution of war in a proper and vigorous manner than any other, no matter how perfect the state of preparation may be.

No country possesses greater store of *undeveloped* military resources than the United States. No civilized country howsoever poor, but surpasses it in developed resources of this nature. Until this country has properly developed some of them, has converted them into forts and armaments, ship-yards, ships and guns, arsenals and arms, with all of the vast and innumerable stores ("from a cradle to a coffin") required for the purposes of modern war, and withal, has organized an army and a navy of trained officers and men, in some degree representing the materialization of these great resources, and in numbers at least capable of directing their proper uses in war; until all this has been brought about this country is bound over hand and foot and under heavy bonds to keep the peace of nations, even with a neighbor apparently so insignificant as the Dominion of Canada.

THE DEVELOPMENT OF NAVAL ARMOR AND ITS ATTACK BY LAND ARTILLERY.*

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IN the investigation of this interesting subject, a knowledge of which is so important to the artillerist, we are met by many difficulties.

From the first, experiments have been carried on in all of the leading maritime countries of the world, and the whole history of armor development must be found in these different series of trials, independent one of the other, often following out different and divergent lines of development, and dependent, in great measure, upon the system of artillery in use in the country where the trial is made.

In pursuing this subject we must include in our investigations not only the quality of the armor plates themselves, but the method of placing them on vessels of war, the different systems of fastening and the kind and quality of backing.

As a matter of course, the attack is carried along parallel with the development of armor, and this requires, in order to be of any practical benefit, a knowledge of the gun and its charge, and more especially the particular kind and form of projectile used.

In the preparation of this paper I have consulted freely all standard authorities at hand, most frequently the works by Lieutenant Very, U. S. N., and Captain Browne, late R. A. I have endeavored to find the salient points in the mass of experiments presented by them, and to sift out the more important principles involved in the subject.

To Mr. Stevens, a citizen of the United States, belongs the credit of first recognizing the importance of armor for naval use; and, although he himself did not live to see the wonderful results of his theories, it cannot be doubted that, as followed

* Read before the class of officers at the Artillery School, Fort Monroe, Va., September, 1889.

out by his sons, these have had a great effect in shaping the growth of naval construction in this country.

The Stevens, father and sons, made valuable investigations concerning the resisting power of iron as against projectiles, and finally submitted a report to Congress on that subject.

In 1854, the Stevens' battery was begun, but after spending about three-quarters of a million, Congress allowed the matter to drop, and the battery was never completed.

Passing over the first rude experiments on armor, both in this country and in Europe, we come to the time when it was first used successfully on ships of war. In 1855 the French constructed three floating batteries with $4\frac{1}{2}$ inches of iron armor, backed by 28 inches of oak; and, in the autumn of that year, these were tested in actual combat at Kinburn, where in four hours they silenced the forts that for many days had held the combined French and English fleets at bay. The armor consisted of solid plates fastened to the backing by through bolts, and was attacked by 68 and 32-pounder smooth bores, firing cast-iron shot. Here the contest between the gun and armor was actually inaugurated, and in this first phase of the fight we find the gun no match for the armor.

This victory worked a wonderful change in naval architecture and at once gave an impetus to the manufacture of iron plates for naval use. Previous to this time rolled plates, more than one half inch in thickness, were scarcely ever needed, and, naturally, great difficulties were encountered in the manufacture of four and four and one-half inch plates, of the required homogeneity, toughness, and ductility.

In England, in 1856, trial was made of plates furnished by different parties, without any limit being placed by the government as to their composition or method of manufacture. From these trials, and others made the following year, it was decided by the committee in charge that soft wrought-iron was the best material for armor plates, and that steel offered no effectual resistance to the projectile. About this time the keel of the *Gloire* was laid in France, and shortly afterward that of the *Warrior* in England, and both were launched in the same year with the *Monitor* and *New Ironsides* in the United States. The *Gloire* and the *Warrior* were both vertically armored, broadside ships, but of very different types. The *Gloire*, much the smaller of the two, was a wooden ship and completely covered with

armor; while the *Warrior* had an iron hull, and owing to her great length, was only partially armored. The maximum thickness on the *Gloire* was $4\frac{3}{4}$ inches, and on the *Warrior* $4\frac{1}{2}$ inches. One important difference in the placing of the armor on these two vessels was that in the *Warrior* the plates were tongued and grooved, while in the *Gloire* the joints were plain butted.

The *Monitor*, rendered famous by her victory over the Confederate ironclad *Merrimac*, was a very small iron vessel of low freeboard, carrying armor of a maximum thickness of 5 inches on the hull, backed by 23 inches of oak, and 11 inches on the turret, with no backing. The armor, of laminated type, was made up of plates one inch thick. It was well established that armor of this kind was much inferior to solid plates, but on account of the greater ease of manufacture and the gain in homogeneity it made perhaps the best disposition for the time.

The *New Ironsides*, the only example of an armored broad-side ship built in this country, had $4\frac{1}{2}$ inch solid plates, with 21 inches of oak backing—that part over the casemate being inclined at an angle of 60 degrees with the horizontal.

The history of these two vessels is well known to all. They served their purpose well, and, without entering into particulars, it is sufficient to say that their armor was more than equal to any guns that could have been brought against them at that time.

Although the real development of armor must date from Kinburn, it cannot be doubted that the battle between the *Monitor* and *Merrimac*, and the subsequent performances of the United States ironclads aroused the civilized world to the paramount importance of armor as applied to naval warfare, and immediately resulted in new trials, involving not only armor but the gun and projectile as well. From this time on, however, we must look to foreign countries for the best information on this subject.

Nor is it to be wondered at that when the Civil War closed, we, as a people, were lulled into a sense of false security. In our heavy smooth bores and Parrott rifles we had most effective guns for that period. We had a strong fleet of ironclads, ready for service at any time; and, above all, a nation of soldiers, competent to fight the guns and handle the ships—the hard school of experience had taught us that at least. But there we came to a halt, and have remained practically at a stand still ever since. Until within very few years our monitors and guns were

scarcely better than they were twenty-five years ago. As to armor, this is unquestionably true. Without investigating for ourselves we have been content to watch from a distance the results in other lands. While there is some excuse for the apathetic attitude of the people at large toward the Army and Navy and all that pertains to them, there can be none whatever for those in authority. Instead of just emerging from the age of the smooth-bore gun and wrought-iron armor, we should be well abreast of the leading nations of the world—not one of them has more at stake.

In the second epoch of the development of armor, the contest may be said to lie between the rifle in its earlier forms and wrought iron armor. And, as incidentally involved in the change from the smooth bore to the rifle, it might be well to mention in this place the two theories of the attack of armor, the relative value of which has never been definitely settled, and the discussion of which is gaining new importance in view of the direction taken in the latest development of steel and compound armor.

When a projectile strikes an armor plate, only a part of its striking energy is taken up in a deformation of the plate, all the rest is dissipated and wasted in three ways; viz., in changing the form of the projectile, in heating it, and in heating the plate. The useful energy is taken up partly by the penetration of the projectile into the plate, and partly in racking the system. In the first case the projectile has its effect over a small area, and in the latter it is spread over a comparatively large one, and acts by cracking the plate and loosening the fastenings. The relative proportion of energy taken up in penetration and in racking, depends upon the size, shape and material of the projectile, and upon the material of the plate, its thickness, its backing and the rigidity of its fastening. Thus it is, to some extent, under the control of both the attack and the defense.

The racking effect of a projectile is measured, approximately, by its total striking energy, while its penetrating effect is usually taken as proportional to its striking energy per inch of circumference. In all of the empirical formulæ for the penetration of wrought-iron, one of these elements appears.

In the United States, for a long time, the racking theory held first place. We had a great number of smooth bore guns of large calibre, whose heavy, spherical projectiles had a powerful racking effect. But soon the quality of wrought-iron for plates im-

proved, being made much thicker, and the fastenings so arranged as to largely offset this racking. Then it became evident that the true theory of attack was to punch or perforate the armor. Indeed, the uselessness of attacking wrought-iron armor with a gun not a match for it is now well established. Partial penetration has little effect on such plates held by good bolts. We shall see later how the introduction of steel and compound armor has changed all this.

We may pass quickly over this second period, noting only the more radical changes and improvements.

From the first, great trouble had been found with armor fastenings. The earliest form, an ordinary bolt of $1\frac{1}{2}$ or 2 inches diameter, having a counter-sunk head held on the inside by a common nut, produced the great objection of tending to snap at the screw thread when the plate was struck, thus causing the nuts to fly about on the inside in the most dangerous manner. Besides, it was almost impossible to stop leakage around the heads. The reports of the behavior of our monitors in action are filled with accidents due to this defective fastening. In the *New Ironsides* the danger was avoided by using the French bolts, introduced about 1862—a special form of iron, wood screw with projecting thread and a conical counter-sunk head, as in the first form of bolt. The plate was held to the backing by the threads of the bolt, the end being some inches from the inner skin, thus there was no nut to fly about the decks.

The English, at about the same time, adopted the Palliser bolt, in which the shank was cut down to the same diameter as the bottom of the thread, so that when the bolt was under a stress, the elongation per unit of area was uniform throughout. Rubber washers were also used to advantage. The plate was cut away slightly to prevent nipping, and in the plate upon plate system. These were bolted together in pairs, and a spherical nut, at each end of the bolt, fitted into a hemispherical socket, giving a limited ball and socket motion to allow for any slight displacement of the plates in action. These bolts were retained until recently, when Schneider began to use bolts extending but a few inches into the back of the plate, leaving the face unbroken. As pertinent to this part of the subject it may be well to state that all efforts to connect the plates by tonguing and grooving or other complicated joints have been failures, the objection being that a strain upon one plate is transmitted to

others through the joints. As previously stated, the smooth bore gun had been practically abandoned in England, France and Germany by the year 1863, and the development of the rifle became so rapid that the gun soon passed the armor, as represented by the *Warrior* and *Gloire* targets. A Whitworth rifle, firing 130 pounder shells of mild steel, attacked a *Warrior* target with the result that every shell penetrated to the interior skin, where it exploded, blowing a hole clear through. Early in 1863, a great improvement in the disposition of the backing resulted from an invention of Mr. Chalmers. His target was made up of $3\frac{3}{4}$ inch plates, with a compound backing $10\frac{3}{4}$ inches thick, composed of horizontal layers of wood and iron plates, behind which was another thin plate having $3\frac{3}{4}$ inches of wood between it and the skin. In the trial it was attacked by the 68 and 150-pounder smooth-bores and 110-pounder rifle, and clearly proved that this disposition was superior to that of the *Warrior* target. In the report of the Iron Committee we find the following:—

“It was found that the $3\frac{3}{4}$ inch plates were much less distorted than the $4\frac{1}{2}$ inch plates on the *Warrior* target, and that the damage to the plates was much less than might have been expected from their thickness. The backing proved much more substantial than the backing of wood without the interposition of the iron plates, which seemed to prevent the crushing of the wood and the spreading of the fracture to the contiguous portions of the backing.”

Owing to this very favorable report, Chalmers' backing became immediately applied to a new ironclad, the *Bellerophon*. This vessel had armor 6 inches thick, with a backing of 10 inches, and an inner skin made up of two $\frac{3}{4}$ -inch plates. Although considered a long step in advance, this target was hardly a match for the best rifles that could be brought against it, as, for instance, the 7-inch Whitworth. It was not until 1865 that armor caught up with the gun—in the disposition made for the water-line of the *Hercules*. The plates were 8 and 9 inches thick with 12 inches of backing, on the Chalmers' system. The Committee reported: “That a structure such as represented by the *Hercules*' target appears to be practically impenetrable by the heaviest known ordnance.”

The success of armor was, however, of short duration. Before the *Hercules*, finished in 1868, could be fitted out for her first cruise, “the Russians had brought one of their new 11-inch rifles against a *Hercules* target, identical in every respect with her midship section at the water-line, and pierced it without difficulty at 1200 yards.”

From this time on, the development of the heavy rifle and consequent increase in thickness of iron armor was wonderfully rapid. Nor must we lose sight of the importance of the projectile in the contest. In 1863 Palliser introduced his chilled shot, and, although not at first completely successful, it soon developed and in 1866 was adopted by England as an armor-piercing projectile. At the same time Gruson chilled shot came into use in Germany. Steel projectiles had scored many a victory, but it was not until later that the cost of manufacture was reduced sufficiently to warrant their general adoption. At the present time they have superseded almost entirely the chilled projectile for armor-piercing purposes. This great increase in the efficiency of projectiles became a potent factor in armor development. In order that the maximum amount of striking energy shall be transferred to the plate, it is essential that the projectile should hold together and resist deformation. Against soft wrought-iron armor the chilled shot accomplished this object almost perfectly; but later, when shot and compound armor came into play, it was found that, although just as hard as the steel projectile, the chilled steel lacked tenacity, and on impact broke up much worse than the latter in its best forms.

In 1872 we find the 12-inch Woolwich gun brought against 12 and 14 inches of iron, backed by 17 inches of oak, the target being the turret of the *Glatton*.

The plates and backing, though considerably damaged, were not completely perforated. During the same year, in Prussia, a 12-inch plate, backed by 18 inches of oak, was attacked by the 28 and 26 c.m. ($11\frac{1}{2}$ and $10\frac{1}{4}$ inch) Krupp guns. In this case the heavier gun showed itself about a match for the target at 175 yards. Already the rifle had increased so much in power that, in ten years after it had been declared that $4\frac{1}{2}$ inches of iron was sufficient to keep out any projectile, it required plates of three times that thickness to accomplish this purpose. In quick succession appeared the $12\frac{1}{2}$ -inch Woolwich gun, Krupp's 35 c.m. ($14\frac{1}{4}$ inch), the 81-ton Woolwich, Krupp's 40 c.m. (16 inch), and, finally, Armstrong's 100-ton gun.

It was thought, at this time, that in 12-inch solid plates the limit of thickness had been reached, and in England they introduced the "Sandwich" armor. This, as the name implies, consisted of two or more plates, with a certain thickness of backing between each pair, the whole being bolted to the main back-

ing. After many trials, it was found that the best thickness of backing between plates was about 5 inches, usually placed in two layers, one horizontal, the other vertical.

This disposition is undoubtedly a good one, but it applies rather to defenses on land than on the sea.

On land there is practically no limit to the number of plates that can be sandwiched together, and plates may be added without difficulty as often as needed for strengthening the fortification. For vessels of war, the limit of thickness and weight of armor is soon reached. As far as I can learn, sandwich armor has only been used upon two vessels—both English men-of-war—the *Dreadnought* and the *Inflexible*. The first carried on her turret 14 inches of iron in two thicknesses, with 9 inches of teak between, the whole backed by 6 inches of teak. Although superior in resisting power to the *Glatton* turret, this was no match for any of the heavy guns mentioned above.

The armor of the *Inflexible*, at her water-line, consisted of a 12-inch plate, 11 inches of teak, a second 12-inch plate, 6 inches of teak, strengthened on the Chalmers' plan, and a skin of two 1-inch plates.

The English naval authorities of the time thought this vessel to be well-nigh invulnerable. Before she was launched, however, the Armstrong 100-ton gun, capable of piercing at the muzzle a 26-inch solid plate, had been completed, and her invulnerability was gone. Later she received a turret of compound armor, and is still one of the most powerful battle-ships afloat.

Emulating the example of England, and aroused to the importance of a powerful navy, the Italians determined to possess the most formidable war vessels afloat, both in defensive and offensive qualities.

There resulted the designs for the *Duilio* and *Dandolo*. Armstrong received his first order for 100-ton guns, and in order to determine the quality and thickness of armor for the two vessels, the Italian authorities called for test plates of 22-inch solid armor from all of the principal manufacturers of the world.

The trial took place at Spezia in the autumn of 1876. There, wrought iron, as used for naval armor, received its death-blow. These trials formed the great turning point in armor manufacture and naturally separate the second epoch of armor development from the last; the modern high-power rifle as against steel and compound plates.

At the trial there were represented two English firms, Cammel & Co. and Brown & Co., and two French firms, Marrel and Schneider.

The Brown plates were 22-inch solid iron, with 29 inches of teak backing and $1\frac{1}{2}$ inch skin, held together by through bolts with countersunk heads. Both Cammel and Marrel submitted one solid 22-inch plate, backed as above, and also two sandwich targets, in which the total thickness of iron was 22 inches, one of each having an 8-inch face plate of wrought iron and in rear 14 inches of chilled iron.

These targets were attacked by 10-inch and 11-inch Woolwich guns and by the 100-ton Armstrong, received the year before by the Italians. This last was by far the most powerful gun in the world at that time and known to be much more than a match for any of the iron targets.

The 100-ton Armstrong had a muzzle energy of 36,178 ft. tons, that of the 11-inch 7015, and of the 10-inch 5356,—the corresponding perforation of wrought iron being 26.3, 14.3 and 12.9 inches, respectively. The test was to be a single shot from the 10-inch gun, a salvo from the 10-inch and 11-inch and finally a single shot from the 100-ton Armstrong.

The 10-inch and 11-inch shots, while damaging all of the targets to a greater or less extent, had the greatest effect on the Schneider all-steel plates. Still, when the crucial test of the 100-ton gun came, there was no doubt as to the respective power of resistance of the two types. No piece of plate or projectile got through the skin of the Schneider targets, while all of the others were perforated with the greatest ease.

In their report the Italian Commission did not hesitate to pronounce the sandwich system of armor much inferior to the single plate system. In comparing the iron with the steel plates they go on to say:

“In considering that within the limits of power developed the defensive qualities of the three iron plates were about equal, since none of them could stop the 100-ton projectile from complete perforation, whilst the Schneider plate did succeed, the question may be put under a more general aspect, and the comparison may be established between ordinary iron plates and Schneider ones by enumerating for both the advantages and faults determined by the tests.

“If we examine, in the first place, the iron plates we recognize in them the following advantages:

“1st. The smashing produced on them by impact is more localized at the point of surface struck.

"2d. They behave better for relatively moderate impact produced by projectiles of ordinary calibres.

"Against these advantages are the following faults :

"1st. Lack of continuity in the mass, arising from the difficulty of forging and rolling plates of such great thickness.

"2d. Relatively less tenacity than the Schneider, and consequently less resistance to penetration.

"3d. Absolute impossibility of preventing complete penetration within the limits of thickness given and power developed.

"The Schneider plates, on the other hand, show the following advantages :

"1st. Greater absolute tenacity and greater certainty of obtaining complete homogeneity in the mass.

"2d. Greater resistance to penetration. Within the limits of the power developed, the target may be depended upon for protection against perforation.

"On the other hand the following faults may be imputed to it :

"1st. A crystalline structure of an aspect almost glassy, which renders the plates more easy to split, even under shocks relatively feeble.

"2d. Greater ease of breaking in pieces, and leaving the frame exposed.

"Considering the energy of guns actually used on vessels and in coast batteries, we may admit that a vessel would be thoroughly protected by either iron or Schneider plates, provided that the thickness was equal to that tested ; but the local effects on the plates seem, under these conditions, to be most objectionable on the soft steel plates.

"From this aspect, the use of iron plates would, therefore, seem preferable, but in looking ahead to the near future we can see, without a possible doubt, that this relative advantage of iron is but temporary, and consequently of a nature to expose a vessel so protected to shortly lose her supremacy, which, in the other case, is assured in attack.

"Consequently, after all these considerations, the Commission has no hesitation in declaring and proposing, as the most advantageous disposition, the single plate presented by Schneider."

On the strength of this report, the Italians adopted as the armor for the *Duilio* and *Dandolo* 22-inch solid steel plates by Schneider.

The Schneider plates so successful at this trial, although included in the broad, general class of steel, differed greatly from any steel plates that had been previously tried. The "Iron Committee," in the early sixties, after exhaustive tests, had decided "that soft wrought-iron was the best material for armor plates, and that steel offered no effectual resistance to the projectile."

But the steel there referred to was the ordinary hard steel, containing, probably in every case, not less than one per cent. of carbon, whereas the steel of the Schneider plates in the first Spezia trials contained little more than one-third of that amount. This was long known as homogeneous metal, but is now gener-

ally designated as "mild steel." Of course the exact composition of the metal and the finer details of manufacture are secrets of the trade. In general terms, the cast ingot is subjected to a careful working, and reduced to the required thickness by hammering or rolling. Schneider uses a 100-ton hammer for his heavier work. After being given the required thickness and shape, it is annealed, the face oil-tempered, and, finally, the whole subjected to a partial reannealing to remove any internal tempering strains. The result is a metal of much greater toughness and tenacity than wrought-iron, while softer and less brittle than the proper hard-tempered steel.

For some time previous to the Spezia trial of 1876, desultory experiments had been made in England with a combination of steel with wrought-iron, but with ill success. The authorities were immediately aroused to great activity by the result in Italy, and in 1877 a competition, known as the "First Nettle Trial," was begun—plates being presented by English firms alone. Of the five plates, one was from Whitworth of untempered steel, plugged with hard steel bolts, three from Camel, one of mild steel (containing $\frac{13}{100}$ per cent. of carbon), and two compound. All were compared with a wrought-iron plate of the best manufacture. They were 9 inches thick, and were attacked by a 9-inch rifle at ten yards range. It is not necessary to go into the particulars of this trial, as it is only important as the first instance where all-steel and compound armor were brought into direct competition.

The steel plates were clearly victorious—no projectile penetrating to the backing.

In the compound plates the penetration was much greater and the cracking more serious. The iron plate was completely perforated by each shot, the projectile sticking in the backing.

From the very beginning the rivalry between the two systems has been active, England with all her prestige as the greatest naval power of the world has steadily favored compound armor and, necessarily the development has been rapid and marked by great improvements. On the other hand, she has given very little encouragement to the manufacturers of all-steel plates, hardly as much as their success in the early competitions deserved.

The great exponent of the all-steel system is Schneider of France, and he has obtained many converts.

The leading manufacturers of armor in England are Cammel and Brown, the former using Wilson's patent and the latter Ellis'.

The two processes differ somewhat in the details, although they turn out plates of about the same resisting power. In Wilson's first process molten steel, manufactured by the Siemens-Martin process, is poured on an iron backing plate made up of thin plates which are united,* "but not thoroughly worked up and amalgamated."

The whole is afterwards taken from the furnace and passed through heavy rollers. In some cases the iron plate is placed on end and the steel run in alongside, giving a greater density in the face. The furnace in this process is of special form and serves as a mould for the face plate. The face is afterwards tempered and annealed. In Wilson's second process a certain thickness of very mild steel is run on one face of the iron plate, after which it is reduced to about two-thirds of its original thickness by rolling or hammering, when a layer of steel containing a high percentage of carbon† (1.25 to 1.05 per cent) is run on the other face. The whole is rolled or hammered as before. This process is said to give plates remarkable powers of resistance.

Under Ellis' patent the hard steel face and the iron plate are manufactured separately; they are placed in a furnace and raised to a welding heat, when molten Bessemer steel of soft quality is run between them. They are then rolled, tempered and annealed as in Wilson's process. The first Wilson plates are softer than Ellis', thus allowing greater penetration, but at the same time limiting the racking effect. The tendency is, as in Wilson's second process, to make the face of harder steel,—indeed, the same thing may be said of the all-steel plates.

Competitive trials between these two classes of armor, all steel and compound, have been held at different times at Gâvres, Spezia, and other places on the Continent with varying results.

By the second Spezia trial, which occurred in 1882, the Italians expected to determine the best description of armor for future use. They had already ordered the armor for the *Italia* from Messrs. Cammel in England, but for her sister ship, the *Lepanto*, the question was as yet undecided.

The plates were 18.9 inches thick, each weighing $31\frac{1}{2}$ tons,

* See "Browne on armor." p. 88, II.

† See Meigs & Ingersoll, p. 153.

and they were attacked by a 100-ton M. L. Armstrong rifle. Three firms were represented, Cammel, Brown and Schneider. The projectile used was of Gregorini chilled iron, $44\frac{1}{2}$ inches long, with the head struck with a radius of $1\frac{3}{4}$ diameters. The firing at all of the plates was under strictly similar conditions, the charge being reduced in the first round so as to give about 21,000 ft. tons striking energy, equal to a perforation of wrought iron of about 19 inches, and in the second and third a perforation of 25 inches, with a total striking energy of nearly 34,000 ft. tons. In the first round both compound plates showed cracks more or less serious, the Schneider plate showing none at all. The second round developed through cracks in the steel plate, and in the compound ones to such an extent as to put them *hors de combat*. The Schneider plate received two more shots with steel projectiles having striking energies as in the last, and at the end was still in condition to offer good resistance to any projectile.

This competition was clearly in favor of the Schneider plates. The English firms ascribed a great part of the ill success of the compound plates as compared with Schneider's to the difference in bolting, Schneider having used more than three times as many bolts in his plate as either Cammel or Brown.

In November, 1882, there was a competition in Russia, on a smaller scale between a Schneider and a Cammel plate. The plates were in this instance 12 inches thick, and were attacked by an 11-inch breech-loading rifle.

The compound plate held up better than the all-steel one, about $\frac{1}{4}$ of the latter being detached from its backing at the third shot.

In 1884 another trial between Schneider, Cammel and Brown plates took place in Italy, the plates being of the same thickness as those used on the *Italia*. They were to be attacked first by the 100-ton Armstrong, B. L., firing a shot at the centre of each target, followed by a round at each of the four corners from a 10-inch gun, all with the best steel projectiles. The striking energy of the projectile from the 100-ton gun was 44,340 ft. tons or 8339 ft. tons per inch of circumference, equal to a perforation of iron of 30.27 inches. The plates were clearly overmatched, and consequently we are prepared to find that each plate was completely perforated at the first shot, but not that both compound plates were so demolished that further firing was impossible after the second round from the 10-inch gun, while the Schneider plate

stood well up to its work after the five rounds of the test were finished. Such, however, was the case, and here the fault could not be laid to the bolting, as that was the same for all the plates.

We cannot wonder that after this the Italians chose the Schneider plates for the *Lepanto*. The contest between all steel and compound armor has been a spirited one. Each type has its advocates who are loath to concede any advantage to the other. At the present time nearly all authorities on the subject admit that the question is still an open one and far from being settled. Nor is its importance so evident, as both types seem to be nearly equal in their ultimate power of resistance to projectiles. They differ principally in the manner in which the energy of the projectile is taken up. The hard steel face of the compound plate offers at first a much greater resistance than the softer steel of the other type, but the latter gives almost a uniform resistance throughout its thickness, or as the expression is, it has more "back-bone."

Now that steel projectiles have been improved to such an extent that they may be fired against either class of armor without breaking up, and with very little deformation, the hard steel face of the compound type has lost much of its usefulness, and the projectile soon reaches the soft wrought-iron back where it meets with comparatively little resistance to penetration. With projectiles of medium or inferior quality, and especially when they are overmatched by the armor, the compound plate is at its best, and the penetration is less than in the all steel; but I do not know of a single instance where a compound plate has kept out a projectile that an all steel one would not, *both plates being in good condition when fired at*. This is the true test of armor, the object of all the development being to keep out the projectile, not to preserve the armor itself. The lack of "back-bone" in the compound armor is shown in its tendency to give back when struck, thus producing the concentric cracks so characteristic of the type and which are never found in the all steel plates. It is a well established and admitted fact that a rigid backing is essential in order to develop the best powers of compound armor. The great objection of the English authorities to steel armor is its liability to through cracks, but it has been abundantly shown that the pieces may be held up to their work by a good system of bolting. In all of the trials between these two classes of armor

in which heavy plates have been used, I think it must be admitted that the all steel plates have shown themselves the better, and in view of the fact that the contest assumes its greatest importance when it is a question of heavy armor, I do not think that it is going too far to say that the United States has chosen wisely in adopting all steel armor for her battle-ships. It is a very significant fact that in the very latest trials held at Portsmouth in 1888, the English authorities have given such great prominence to all steel plates furnished by their own manufacturers [nine out of the eleven plates tested were all steel]; and although no official report has been published as yet, from unofficial sources we learn that a solid steel plate from Cammel showed wonderful resistance with very little cracking. It would seem from this that the English have lost that supreme confidence in the compound type that they formerly held, and are more than willing that their manufacturers should develop the solid steel armor.

Lieutenant Very seems to think that the two classes will gradually approach and finally merge into one another, thus giving armor of all steel, but of varying tenacity, hardness and toughness from the face to the back, the face being of very hard steel and the back of much softer mild steel with great elongation, the whole combining the good points of both classes. Something like this was attempted by Cammel in March, 1884.* He made a plate $10\frac{1}{2}$ inches thick, the face being of hard steel with a tensile strength of 47 tons per square inch, and elongation of 1.5 per cent. and the back of mild steel with 23 tons tenacity and 25 per cent. elongation. For wrought iron used for the same purpose the tenacity is about 17 tons and the elongation 18 per cent. When this plate was attacked by a 10-inch muzzle-loading gun, through cracks were developed. The same thing occurred when Browne & Co. tried a compound plate with a backing of wrought iron having unusual tenacity and elongation. Captain Browne concludes: "That this result seems to show that low tenacity is a necessity for metal in the back of a plate, if it is to be kept from cracking through." "The great power of elongation is, consequently, useless under impact, unless the plate elongates with but little resistance." Undoubtedly both systems are constantly increasing in efficiency, as is shown by late comparisons with wrought iron, as to their resistance to penetration.

* See Browne, p. 90, II.

In October, 1888 tests were made of the Schneider plates for the Swedish armor clad *Göta*.* They were 9.6 inches in thickness and were attacked by a 15 c. m. gun firing a projectile capable of piercing 11.6 inches of iron at the range of the target. Three shots were fired with penetrations of 3.8, 3.4 and 3.7 inches respectively. The plate was reported as practically intact at the end of the trial. With the earlier plates a penetration of nearly 8 inches would have been looked for at each shot.

With their best efforts, however, the manufacturers of naval armor have not been able to keep pace with the gun and projectile. The following is a table showing the heaviest high power guns of different manufacture, coming in after the 100 ton M. L. Armstrong:†

Gun.	Weight, tons.	Projectile, lbs.	Diameter, inches.	M. V. Ft. S.	E. Ft. tons.	Penetration of wrought iron, inches.
Elswick ...	110½	1,800	16.25	2,148	57,580	35.5
Krupp.....	119	2,028	15.75	2,000	56,250	35.4
French.....	71	1,180	14.66	1,955	31,272	27.4
Armstrong..	104	1,799	17.	2,018	50,810	32.3

The rapid fire gun has received a good deal of attention of late and must certainly be considered in determining upon any system of armor. The muzzle velocity, striking energy and penetration of the larger ones are here given:

Gun.	M. V. Ft. S.	E. Ft. tons.	Penetration in wrought iron, inches.
Elswick, 36-pounder.....	1,946	945	7.3
Hotchkiss, 70-pounder.....	1,924	1,797	10.5

In mentioning the ordnance that will be used against armor, the new rifled mortars must not be omitted. ‡ Our own 12-inch rifled mortar fires a projectile weighing 627 pounds with an initial velocity of 1150 f. s. and remaining velocities at 2000 and 10,480 yards of 1003 and 855 f. s. respectively, equal to a perforation of wrought iron of 10.5 and 8.96 inches, assuming normal impact. At five miles the corresponding perforation is 6.6 inches. On account of their cheapness, many of these guns will be used in the future for sea-coast defense, and we see from the above figures that they are more than a match for the deck armor of any war vessels now afloat. The projectile has

* See Information. Series No. VIII., p. 427.

† See McKinlay, p. 313; and Browne, p. 100.

‡ See JOURNAL MIL. S. INS., No. 38, p. 244.

improved along with the gun and at the present time forged steel projectiles, the Holtzer, St. Chamond, Krupp, Whitworth and others seldom break up badly against any but the hardest chilled armor.

In the defense of sea-coast fortifications attacked by armored ships, it is absolutely essential to know exactly what is to be brought against them in the attack. To this end a list of all foreign navies should be furnished to each commander, giving a detailed description of every ship, such that any vessel could be recognized at once, and her armament and armor found at a glance.

In order that the guns of the defense may be properly directed, the exact nature and distribution of the armor must be known.

All armored ships built previous to 1876, are armored with wrought iron. Against such armor it may be laid down as a rule:* "That it is useless to attack with projectiles that have not at least 1000 feet striking velocity for each calibre in thickness of the armor," otherwise only partial penetration will result, which does very little injury to the plate. On the other hand steel or compound armor may be overcome, *in a sustained attack* by guns that are no match for it, and that would be useless against wrought iron of the same thickness. The total striking energy of all the projectiles is nearly the measure of their effect against any hard armor plate, the blow being taken up by the entire mass of the plate, whereas in wrought iron the effect is strictly local. For the penetration in wrought iron, we make use of empirical formulæ. We have Fairbairn's, Maitland's, Inglis' and still others used on the Continent, any one of which will give results sufficiently accurate for all practical purposes, requiring only the striking energy, and constants easily obtained. The rule of thumb, first proposed by Captain Browne, also gives a very close approximation. It is "That the penetration in inches is equal to the velocity in *thousands* feet per second, multiplied by the diameter of the projectile in inches."

All of the formulæ mentioned are for armor piercing projectiles; for common shell, the rule is that they are capable of perforating a thickness of iron equal to one half their diameter, without breaking up. Sufficient data have never been obtained, to make a formula for penetration in hard armor, indeed it is only

* See Meigs and Ingersoll, p. 174.

recently, that is since the great improvement in armor piercing projectiles, that penetration in the true sense has been effected in either steel or compound plates.

It has generally been assumed, in lieu of a better rule, that a compound or a steel plate is equal to one of wrought iron of from $\frac{1}{3}$ to $\frac{1}{4}$ greater thickness. In oblique penetration, it has been found by experiment, that a projectile from a heavy gun cannot bite at a less angle than 30° with the face of the plate. For this kind of penetration, the flat-headed projectile is considered the best form, as it will bite at a less angle than any other, and the ogival headed projectile with an ogive struck with two diameters is better for this purpose than one with a head struck with one and a half diameters. Projectiles almost invariably break up on oblique impact, especially if the plate is more than a match for the gun. As the majority of hits in actual service, either in a naval combat, or in the attack of a fortification by a fleet must be oblique, this is undoubtedly a great point in favor of the armored vessel.

The first armor clad ships built, were of the broadside type, completely covered by thin plates; but soon the increase in thickness necessitated a change in their disposition. It became impossible to afford protection to every part of the ship, and the great weight of armor was concentrated at the water-line and the batteries, where protection was all important. The water-line belt, which at first extended the whole length of the vessel, was made thicker in the middle, in order to thoroughly protect the machinery, and tapered to some distance below the water line.* "The English concentrated their guns in a central casemate, the French protecting their smaller guns in the same manner, but placing the heavy guns in barbettes with larger firing arcs. The Italians have separate protected gun positions." Many vessels built in the different countries of Europe, after the success of our *Monitor*, had their heavy guns protected in turrets. France has steadily adhered to the complete water-line belt, and as the necessary thickness of the belt increased, it was at the expense of the auxiliary batteries, which are often left entirely unprotected. The heavy guns are as widely separated as possible, in heavily armored barbettes with protected ammunition tubes. The *Admiral Baudin*, built in 1878, is an example of this class. She has three barbettes, high above the water,

* See Gen. Inf. Series, No. VIII., p. 83.

with 15.75 inches of steel armor, and a water-line belt of the same 21.65 inches thick. Her secondary battery is unprotected. Knowing the distribution of her armor, a commander could at once decide upon his method of attack. Unless the situation were such that the fire would be long continued, only the heaviest guns should be brought directly against the water-line belt or the barbettes. The lighter ones would be much better employed against the secondary battery, the tops and the crews in the barbettes.

In England compensation was made for the increase of thickness and weight of armor by leaving the ends unarmored, resorting to protective decks and water-tight compartments, thus the vitals of the ship are protected and the curved steel decks serve to keep out direct fire from below the water-line.

The *Inflexible* is an example of this class. She is a turreted ship carrying 17 inches of compound armor on her turrets and 24 inches of sandwich armor over her central citadel. In an action with this ship it would be absolutely useless to attack her citadel with guns not equal to that thickness of two plate, sandwich armor, as the racking effect would be very inconsiderable and partial penetration would do no damage.

The shortened water-line belt, in conjunction with armored or deflective deck for the unarmored ends, has been more or less used in every country except France. The deflective decks may be either curved or plane-sided and are of steel from 2 to 4 inches thick. They both start from a point below the water-line and rise to a height at the centre line sufficient to give room below for machinery, etc. The sides are inclined at such a slight angle with the horizontal as to deflect nearly all direct shots. In many cruisers this protective deck and steel gun-shields constitute the entire armor.

In England, before 1880, the heavy guns were usually concentrated in a well-protected position, either in turrets or in barbets, with a central citadel. Since that time they have rather followed France in separating the protected-gun positions, the object being that the entire main battery should not be disabled by one well-directed shot. The latter disposition, however, is at great expense in weight of armor.

Of the Italian ships, the *Duilio*, *Dandolo*, *Italia* and *Lepanto* have their guns concentrated in an armored central citadel or barbet. The *Re Umberto*, built in 1888, has her heavy guns separated.

The development of rapid fire-guns and shells charged with high explosives has had a great effect upon the distribution of armor in the latest ships of war.

In a paper presented to the British Parliament in February, 1889, we find the following :

"It was decided, however (by the Board of Admiralty), in view of the great development of high explosives, that in any new designs for barbette ships the proportion of the water-line, protected by the belt of armor, should be greater than the corresponding proportion in the Admiral class, and further, that the armored barbette towers should be carried down to the top of the belt in order that there should be no possibility of the bursting of shells containing large explosive charges under the floors of the barbettes upon which the revolving-gun platforms are carried."

"It was decided that, in the barbette designs, the broadside, from the top of the belt armor to a height of about ten feet above the water, should be protected by armor of moderate thickness."

"One point which received the most careful consideration in relation to all the designs, whether for turret or barbette ships, was the protection proper to be given the guns in the auxiliary armament in view of the development of high explosives and quick firing guns of large calibre."

A thickness of four or five inches of compound armor was considered sufficient for the purposes stated, and the latest ships designed, not only in England, but in France and Italy, have such protection, which will be increased in later designs if any weight can be safely taken from the water-line or other armored parts.

We have followed roughly the development of naval armor through its different stages, from the 4½-inch plates used on the *Gloire* and *Warrior* to the heaviest steel and compound plates of the largest modern war-ships. It only remains to consider what guns we have for defense in case of an attack by a foreign fleet composed of these powerful vessels. The result of the consideration or investigation of this phase of the subject must be humiliating in the extreme to any true American. Along the entire length of our coasts we have not a single modern, high-power rifle, mounted ready for use. We have only our old heavy smooth bores and a few converted rifles, all of which would be absolutely useless except against the lightest armor-clads, and then only at the very shortest fighting ranges.

The 15 inch S. B., has a muzzle energy of about 9000 ft. tons, and is capable of perforating 10-inch of wrought iron at 1000 yards. The 8-inch converted rifle at the same range can perforate about 8 inches of iron. They may be utilized for secondary

* See Gen. Inf. Series, No. viii., p. 91.

defense, for flanking batteries, for submarine mines, etc.; but even in such cases, they are too clumsy and unwieldy to be very effective, when compared with modern guns that are used for the same purpose.

The proposed heavy guns for sea-coast service are :—*

Gun.	Wt. of Proj. lbs.	M. V. F.S.	M. Energy Ft. Tons.	Thickness of iron in inches can perforate at muzzle.
8 inch	290	1,850	6,880	17.3
10 “	575	1,850	13,642	21.8
12 “	1,400	1,850	23,725	26.2
16 “	2,300	1,850	54,568	34.4

Since the report of the Board on Fortifications from which the above was taken, an 8-inch built up steel rifle has been actually tried, and gave as high as 7333 ft. tons muzzle energy, equal to a perforation of 17.9 inches of wrought iron. In 1888, \$1,500,000 was appropriated for the purchase of rough finished steel forgings, for high-power coast-defense guns of 8, 10, and 12-inch calibre. At the same time a Board of Ordnance and Fortifications was created, with power to contract for at least 50 ten-inch, and 50 twelve-inch steel guns, and 50 twelve-inch cast-iron, steel-hooped B. L. rifled mortars, from private parties, which should fulfill the requirements of the Board. The 10-inch gun must show a power of at least 15,000 ft. tons muzzle energy, and the 12-inch at least 26,000 ft. tons.

Such guns would compare very favorably with the best guns in foreign services. We have now every reason to hope that Congress will at last give us the guns and fortifications so urgently demanded by our unprotected coasts.

* See report of Fortification Board, 1886, p. 64.

THE LIGHT BATTERY IN TIME OF PEACE—WHAT IT IS AND WHAT IT SHOULD BE.

By L. G. B.

IN writing this paper I have in view my experience during the regular tour of duty with the Light Battery. It is not believed to be exceptional and it is thought that most of these remarks are applicable to the whole Light Artillery service.

The drills were as follows: During the season for mounted drills there were battery drill for three hours in the morning and standing gun drill one hour every afternoon. During the winter season the battery was drilled for one hour every morning in the manual of the sabre, and sabre exercise.

It will be observed that the time allotted to these two latter objects is entirely disproportioned to the space occupied by the subjects in the drill book. These drills consequently became very monotonous in a short time. In the case of the winter drills, this monotony was relieved by introducing gymnastic exercises, and a system of broadsword practice.

The battery drill also became very monotonous before the end of the tour. The captain of the battery always retained command at drill, and when he was prevented from attending drill, the battery was divided into two platoons, and drilled by platoon.

The battery did a small amount of marching during the summer manœuvres, and, I understand, did considerably more the summer that I was absent. There was no target practice during the time which I spent with the battery, on account of the want of a range, but it is believed that if solid shot, or shells with a blowing instead of a bursting charge had been used, a range might have been found.

Guard duty was performed in the way usual in light batteries. A guard of two non-commissioned officers and six privates was detailed from day to day, and was under the orders of the battery commander and battery officer of the day, the latter detailed from the lieutenants of the battery.

During one winter season, the officers' school took up a study of the horse, and veterinary surgery, and also the tactics of light artillery.

The object of the above description is to show that the duties performed were generally of a routine character.

Each light battery is declared by the Army Regulations, to be a school of instruction in light artillery for the subalterns of the regiment. For this purpose each is granted an increased number of men, and certain other advantages. The length of the tour of duty is the same as that of the Engineer School of Application, the Artillery School, and the Cavalry and Infantry School, so that there is ample time to learn a great deal about light artillery.

Before deciding what the light artillery instruction should be, we must first see what portions of the present system can be dispensed with.

The first thing would be, to see that all routine duty was well learned and then reduced to a minimum. Drills should continue only so long as is necessary to secure efficiency in that particular direction. There are two other things which deserve attention,—the battery guard and evening stables. As to the first, if we were to try to do guard duty in the hardest possible way, we would probably require each organization to furnish its own guard for its own property and quarters. But as we are not trying to do so, we follow, except in the light batteries, the method prevailing in civil life and elsewhere, of uniting the efforts of all in the same direction. The only reason that I have heard for this exception, is that the battery, being accustomed to furnish its own guard, will then always be ready to take the field. But this reason would equally apply to the other arms of the Service. As a troop of cavalry can take the field without difficulty, there is no reason apparent why a battery should not be able to do the same. Also my experience has been that officers and men will do any sensible thing without much trouble.

The practical working of this system of separate guards was as follows: a sentinel of the post guard was in charge of the quartermaster's and commissary store houses, and the quartermaster's corral during the night; while next to him it required two sentinels day and night, save when the battery was at drill, or at stables, to guard the battery stables and park during the summer, and the battery stables alone in the winter. The post

sentinel had a feeling of responsibility, which kept him from committing many of the irregularities which were common with the battery sentinels. I had inspected the post sentinels every third night, for nearly a year at a previous station, and only on one or two occasions found sentinels not alert. On the other hand, in the light battery, on one occasion, I found a sentinel asleep. At other times in the stalls, ostensibly tying loose horses, and usually sleepy.

It is true that this state of things might have been modified, to a certain extent, by a stricter discipline; but there is nothing which can take the place of the feeling of responsibility, caused by having something to guard. Guard duty was a secondary matter, and will usually be so under this system. The post sentinels had orders concerning enlisted men to enforce, and enforced them in a most thorough way against the artillery. At the same time, the infantry officers and men felt aggrieved, because the artillery was withdrawn from post guard duty, although this was strictly in accordance with the Regulations. The light artillery force is so small, and the batteries are found at such a small number of posts, that the system will usually be strange to any troops with whom it may be called upon to serve. Consequently in the future, as in the past, this system will be the cause of much friction.

Antagonisms arising in peace, are very apt to affect the efficiency of an arm in time of war. In fact, one of the causes given by Prince Hohenlohe for the failure of the artillery in 1866 was a similar antagonism.

If the battery guard were abolished, a great saving of time and labor would be made. Its duties could be done by the stable orderly, and one sentinel of the post guard, as in the cavalry. As the object of a light battery is instruction, and as this instruction cannot be carried on without a specified number of men, the following regulation would be proper: "No details shall be made, which will leave a light battery with less than fifty enlisted men for drill, during the season for mounted drills." This would allow: one 1st sergeant, one stable sergeant, one battery cook, one battery tailor, one battery gardener, and to each section one sergeant, one corporal, and nine privates, not enough for all purposes, but enough for many.

The horses of the light battery are purchased at an age of about five years, and up to that time they have never been

groomed more than once a day. This labor is one which is delegated to boys and hired men on farms; and although usually slighted in this respect, the horse is sound when purchased.

But now a great change comes over the animal. The moment he is accepted and branded "U. S.," on his near shoulder, the principal object of his life becomes "to submit to grooming." No matter whether warm, or cold and tender,—with oats, or without oats,—he must still be groomed twenty minutes each morning and evening. The quartermaster's horses alongside, are lucky if they are groomed five minutes a day each; yet they seem to get along just as well.

This was an experience of mine while in the light battery: Drill from 6 to 8.30 A. M. Each driver brushed off his horses before going out. Then 8.30 to 9.10 grooming. The horses stood at the picket line or grazed until 4 P. M. Then they were again groomed. I believe that some of these groomings were superfluous. The proper function of grooming is the removal of loose hair, dirt and vermin. This can all be done at morning stables, and anything further is cruel to the horse. There is no reason for the present practice but tradition.

To discover how to spend the time gained by the shortening of the present drills and the abandonment of battery guard duty and evening stables, we must examine the qualities of a good battery. The first is to shoot well, the second to march well, and the last to drill well.

It will be seen that we have about inverted these requirements in our Service.

It was thought by some that shooting with the rifle could not be a science, and that in war the soldier would always blaze away, expecting to scare if not to hit the enemy. This idea as applied to small arms, has been abandoned by everybody except a few of the older officers of infantry; but it seems to prevail still with respect to artillery. The modern gun, breech mechanism, fuze and projectile, and powder, constitute a delicate combination, requiring great skill in handling, and still it is not thought necessary to allow artillery officers to become skilled in their use. The sight and range-finder are also parts that require experience.

Little attention has been paid to these subjects, except, perhaps, in the machine gun battery of the 1st Artillery, but the

sooner we take them up the better the United States will come out in the next war.

In this connection, it is worthy of notice, that the German artillery was well handled in the war of 1870, except in the use of the shrapnel, and to the poor handling of this projectile, the want of execution, which General Sheridan noticed, has been attributed.

Guns.—The light battery being a part of the standing army should have its own armament, which it should use on occasions of parade and in time of war. But as it is also a battery of instruction, it should have complete units of the various kinds of light artillery which we may be called upon to use in time of war. In the term light artillery, I include all kinds of artillery which are usually moved from place to place by horse power.

Mountain Guns.—The War Department owns a number of Hotchkiss mountain rifles. On one occasion that I know of this gun was served by an infantry detachment commanded by an infantry officer. The latter was the only one of the detachment who knew anything about the gun at the start, and his knowledge was obtained in two drills at West Point. The gun did fair service, but how much better it would have done, if it had been in the hands of a skilled detachment, can readily be imagined. It is respectfully suggested that this gun, or one like it, should have been issued to a light battery at first, and then sent with its skilled detachment to the scene of the outbreak, when needed.

It was proposed, some time ago, to equip one battery as a mountain battery. In this way the 1st Artillery would, in time, have become a fairly efficient light artillery regiment, with one ordinary (3.2 in. guns) light battery, one machine gun battery, and one mountain battery, but there is no reason why each artillery regiment should not become just as efficient in a less time if these guns are only issued to all the light batteries.

Machine and Rapid Fire Guns.—These guns may be divided into two classes: 1st. Those carrying small-arms projectiles. 2d. Those carrying a projectile of greater than small-arms calibre. The War Department has a number of Gatling and Gardner (or Pratt-Whitney) guns representing the first class. Of the second class we have only the Hotchkiss revolving cannon, and most of the latter are not at artillery posts.

On one occasion a Hotchkiss 1.45 inch revolving cannon was

sent in from a Western station. The whole gun was rusty, the feed-trough was bent so that it could not be used until straightened, some of the implements had been lost, the powder had been removed from the cartridge cases and the firing spring mislaid. After arrival, it, together with a Gatling gun, was placed in the vicinity of the flag-staff to ornament the post and furnish occupation to the colored ordnance sergeant, who, during fair weather, cleaned these guns from the time visitors began to arrive until the last visitor had departed.

Field Guns.—There are certain problems connected with field guns which are by no means solved to-day, and on which the opinion of artillery officers, after trial, would be valuable. Among them are the relation between the weight of gun and carriage; the practical limit of aimed fire of the light and heavy guns; the mobility of the heavy guns; the width of tire of the wheel, and many others. It is true that some of these questions concern the Ordnance Department, but perhaps the ordnance officers might be willing to learn something on these subjects.

One or more of the heavy field guns should be in each battery; also one or more of the position and siege guns and howitzers should be accessible to each battery as soon as enough are completed.

Each battery should be supplied with enough saddles to instruct the men in riding and to provide for mounted detachments for one platoon. The saddles, which are a part of the harness, would form part of this number; nearly every man can be taught to be a good rider, and there is nothing that can improve the *morale* of a battery more, than for each man to be a good rider and a good fencer and boxer.

The number of these extra guns should be such that a platoon of each could be made up, at each post where a light battery is serving, and if a whole battery could be made up it would be all the better. At posts like Fort Riley, where there are several batteries, the extra guns could be turned over from one battery to another during the drill and target seasons.

Carriages.—The artillery carriage when limbered should be regarded as a cart or wagon for the transportation of the piece and ammunition from one point to another. We should use all inventions found useful in civil life. One of the most striking defects of the present system is pointed out by Captain Michaelis, U. S. A. "He considered the gun-carriage and

limber as a wagon. * * * It is a wagon with a flexible reach and a rigid pole. Nowhere had he found such another construction. In all his wanderings he had never met a four-wheeler in which these conditions were not exactly reversed. Every wagon he had seen had a rigid reach and a hinged pole."*

Captain Michaelis also has a plan for remedying this defect. And with the defect once recognized, it ought soon to be corrected. In addition, great relief for the wheel-horses would be obtained by hitching the swing team to a double-tree at the end of the pole after the manner prevailing in civil life. The lead team might also be advantageously attached in a similar manner.

The objection to the present system, is that it multiplies the strain on the wheel traces, by the number of pairs. If a trace is broken, or horse disabled, all the pairs in front are disabled. With the proposed system, only the one concerned is disabled. It increases the strain on the shoulders of the wheel and swing pairs. As regards the horses in front of the wheel pair, it has about all of the disadvantages of the abandoned splinter bar.

The objection to the proposed system, is that it adds a slight weight to the end of the pole, but this would be more than compensated for by the fact that if the line of traction passed through the pole, much of the present thrashing of the pole would be prevented.

Furthermore, for route marches, when not in the presence of the enemy, the drivers should be taken off the horses and the team driven with lines. These lines would be of small rope and simple in construction. The drivers could mount in an instant, to meet any emergency that might arise.

At drill, and in the presence of the enemy, the horses should be ridden :

To give the horses more to do at drill.

To keep the team in hand.

To accustom spare drivers to riding, and off horses to being ridden.

Horses.—The great trouble with artillery horses in garrison, is that they are not worked enough. They are fed nearly the full ration of grain, and get fat and lazy. But when they go into the field, they are sometimes called on to do hard work, on a short

* "The Army of Kukuana-land." Journal of the Franklin Inst. for Oct., 1889.

allowance. It would be well to require them to pick their living, for a portion of the time, in garrison, so that they could do so in the field if necessary. They should also be trained to pull, and if so trained it is believed that, with modern improvements in carriages and harness, the limit of weight for nearly all kinds of artillery can be safely raised.

A team of farm-horses now draws a wagon weighing 1200 lbs. and a load weighing from 2000 to 4000 lbs., over rough roads ten miles to market and then trots back with the empty wagon. They do this amount of work every day and have no better care than artillery horses in general.

Let us see now how these ideas could be put in practice. The changes in the drill system can be made by the commanding officers of the batteries, or any superior, and will naturally follow from the other changes. Stables, and the system of guard duty, can be changed from the headquarters of the Army by a general order.

Target practice can be carried on to a much greater extent than now with the present allowance, if shells are filled with a blowing, instead of a bursting charge; in the former case they can be recovered and used again.

In the present system, the ammunition is fired away about as fast as possible, against rocks, and with bursting charges, to get through with it as soon as possible.

The fuzes are generally so bad, that they neutralize many of the effects of care in other directions.

The present allowance is not too small if used with care, and supplied for the proposed equipment. It is:

3-in. guns, 25 standard projectiles per gun, and 50 old pattern projectiles per gun.

3.2-in. gun, 25 standard projectiles per gun.

Hotchkiss B. L. mountain gun, 25 standard projectiles per gun.

Hotchkiss revolving cannon, 100 standard projectiles per gun, or their equivalent in money value if reloaded.

Each machine gun, 2000 ball cartridges or their equivalent in money value if reloaded. As many blank cartridges as necessary.

If economy be sought, the supply of blank cartridges might well be limited. The present method of proceeding is to come into battery at one end of the drill ground, the command "commence firing" is given, bang! bang! go the guns, aimed at nothing, fired at nothing. Then "limber rear," and away they

go to the other end of the drill ground, then "in battery" and bang! bang! again, without any earthly object, except the slight one of accustoming the horses to the firing. This is called drill.

We fired about 100 blank cartridges a day for a comparatively large part of the drill season, each one costing twenty-five cents. A time-shell costs \$1.70, a percussion-shell \$1.95, and a case-shot or shrapnel, \$2.00 for the 3-inch gun. If the Government cannot afford us enough projectiles for practice as things now stand, let it abolish or reduce the allowance of blank cartridges. Out of the cost of ten blank cartridges, we could get two good rounds. This would give us an ample amount.

The War Department has on hand enough Gatling guns, revolving cannon, Gardner guns, and mountain rifles to issue one to each battery. The old form of siege gun could be issued until the new ones come.

All these things can be done if the authorities are willing.

It should not take very long for ten guns, of the other kinds mentioned, to be made and issued.

As to other matters mentioned, it would require the appointment of a board on artillery materiel, composed of artillery officers, and one ordnance officer. I add the latter, because he would possess valuable knowledge, and also his presence would spur the others to their best endeavors.

Although this is a subject of the greatest importance to the artillery, much greater than the system of drill, there has been no uniformity or system about it in the past. Some examples of the resulting crudities are the following:

In the case of our siege artillery, the designers of the guns and carriages have, singularly enough, taken as a limit the weight which the present style of ponton bridges can support, viz.: 7500 pounds for carriage gun and limber; and this notwithstanding the fact that the English have had a limber, carriage and gun weighing about 13,000 pounds for some time. This class of artillery will never be required to move faster or further in a day than infantry; will usually move from place to place by rail, and will always be well supplied.

There is a further fact that there are now in this country two breeds of horses especially adapted to this service,—the Percheron and English draft horses—which can be bought in large numbers. Any of these horses can draw a load of 3500 pounds

without difficulty over ordinary roads. But to be within the limits of safety, I have estimated the load for each horse at 2500 pounds; and with six horses this would give 15,000 pounds. A spare pair would accompany the team.

With the proposed improvements in carriages and harness this system would be practicable, and the advantage of having guns of this weight for use in battle against the artillery and works of the enemy, might counterbalance the disadvantage of having to change some of the plans of our ponton bridges.

Again. I have never seen a broken artillery wheel. I have never heard any man say that he had seen an artillery wheel broken except from the shot of the enemy in action, and from dry rot. Hence I would infer that artillery wheels, battle and dry rot being excepted, are like mules, immortal. It would seem that some of the spare wheels were unnecessary or that we might shave down our wheels a little, especially those of the limber and caissons. Nevertheless, in our new siege carriage for the 5-inch gun the wheels weigh 374 pounds each, making the total weight of the four wheels about 1500 pounds, or nearly one-half the weight of the gun, and one-fifth of the weight of the gun-carriage and limber complete. This wheel has a steel tire 4 inches wide and $\frac{5}{8}$ inches in thickness, weighing about 136 pounds.

The weight which we assign to each artillery horse for the 3-inch gun is just about the same that a family horse has to draw, when it is hitched to a buggy. In the latter case the harness weighs, I should say, not over ten pounds, in the former it is so heavy that strong men are frequently strained in putting it on. When we remember that one pound on a horse's back is about equivalent to ten on wheels we can see that the loss is great. There is no need to multiply examples, the factor of safety is too great.

In the tests of traces made by Colonel Williston, the tensile strength was from 1590 to 5970 pounds, giving for the various parts of the lead-traces a factor of nine and over. The new traces are stronger, so we may assume the new factor of safety to be at least 12. Engineers used to think that this number should generally be 5; but the Brooklyn bridge stands well enough with a factor of safety of 3.

The proposed Board must find out exactly what we want and then by applying well-known principles and mechanical construc-

tions now in every-day use in civil life we will have a system of artillery, symmetrical, modern and effective.

The present Commander-in-Chief of the Army is entitled to the thanks of the artillery for the facilities for the practice of their heavy batteries which he has already secured them. If he can make possible the thorough instruction of the light artillery by giving them the guns and needed facilities, some of which are herein referred to, the debt of gratitude will be doubled.

THE PRACTICAL EDUCATION OF THE SOLDIER.

BY FIRST LIEUT. C. D. PARKHURST, U. S. A.,

FOURTH ARTILLERY.

SO long as armies exist the necessity for military instruction must follow, and the problem is, how best to conduct such instruction as to secure the greatest benefit in a given time.

"In days of old, when knights were bold," the aspirant for military honors did not consider any amount of hard work and exacting service as beneath his dignity. From young boyhood to early manhood he was constantly at work being trained in all that was then considered most essential to his after success. Bodily exercise to strengthen his muscles, horsemanship, feats of arms with all weapons then in vogue, menial service in the care of horses, of armor, of weapons, in camp and at home, were all parts of his daily exercise, and not till he had proved himself worthy by his strength, skill, and dexterity, did he finally graduate from his subordinate position and become the full-fledged knight and soldier.

With our Indian tribes we know that the warrior is trained from earliest infancy. As a boy he learns to ride, to shoot, to hunt, to follow the trail, in short, to do all the many things essential to his success as a warrior, and not till he has proved his worthiness does he finally take his name and rank among the fighting men of his tribe.

In both these types of warriors, so widely separate in every way, we cannot but observe one underlying principle of training—the practical instruction that has been given as contrasted with mere theory. We do not read that the knights of old were celebrated for their erudition as a class. We know that our Indians have no written language. In both cases the practical stands forth as the prominent feature of the training, and it is thought that throughout all ages the practical soldier has been the most successful one.

But we are living in this progressive nineteenth century. Our armies are organized upon a different basis from any

that have gone before. How then shall we instruct our men? How much theory and how much practice shall be imparted in order to produce the most effective soldier? Are we now doing the best that can be done towards such an end; are we making the best possible use of our time; is it possible to so alter, amend, or progress in our methods as to produce better soldiers and thereby better results? It is the purpose of this paper to discuss these points and to try to show wherein our methods are faulty, and wherein great improvements may be made.

All instruction, of whatever kind, is but a means to an end. Whatever we may do, the end to keep in view is the making of a good soldier, a good army—the aggregate of many good soldiers—being what we are striving for. Inasmuch as we have no military class, and as our material must be drawn hap-hazard from those who present themselves to be moulded and trained until they become soldiers, let us examine into the methods generally in vogue and see wherein they fail and wherein they can be improved.

Our elementary instruction consists first in trying to “set up” the man, and in the endeavor to render him subordinate and tractable to orders, thus laying the foundation upon which all subsequent education must rest. Now, at the very beginning, I think we adopt a wrong method. Having laid the foundation improperly, all our subsequent building results badly, and our man never becomes the perfect soldier he should be. In the first place we make the mistake of not taking into proper consideration the quality of the material with which we have to deal. We take men from every avocation in life—men whose muscular development has either been entirely neglected, or only partially brought out by the various trades they have followed before enlisting—and these we expect to form almost at once by the simple and perfunctory routine of the “setting up” exercise and squad drill. Would it not be better to break these men in gradually; to take them first to the gymnasium, free from all constraint, and there teach and train each man individually; develop his neglected muscles, give strength, ease, quickness and confidence to all his motions, gain his confidence and respect, insensibly bring him to the quick and unthinking obedience to orders, and then, and not till then, put him into ranks and begin to teach him to march, to face, to wheel, to become in reality a soldier.

What the new drill books will contain upon this point I cannot, of course, say; but I would have a thorough gymnastic training laid down as the first thing to be taught. Then,—after his muscles are trained so that he can move with ease and quickness,—let him begin his purely military education. This would be easily acquired, and be a fit supplement to his muscular training, and the recruit would soon be ready to take his place in ranks, and to march as steadily as the oldest soldier.

I speak from experience when I say I think the present system nonsensical and absurd. I was put in ranks as a “plebe” at the Military Academy, and left to get along as best I could. Hard work is no name for the torture of muscle that was undergone in the constraint of a tight shell-jacket while being put through the “flying drill,” the balance step, double step, etc. Had I been taken in my shirt-sleeves, free from the constraint of ranks, under a competent and kind instructor and taught how to develop my muscles, I would then have been able to learn all that was necessary much easier, much quicker, much better in every way. I would not then have learned to hate all such drill, to go through it perfunctorily when I had to go through it at all, and to keep out of it all I could.

And again I speak from experience, when I say that I think the other system the better one. For now nearly two years it has been my fortune to have used gymnastics as the first “setting up” drill for recruits. Not a recruit during that time has been placed in ranks to be taught the “setting up” exercise. They have been taken just as they came,—green, awkward, loutish, perhaps,—and put first through the gymnasium, and with most beneficial results. Not only did they learn all the things they are supposed to learn, but they learned many others and, most important of all, they acquired strength, ease of movement, an erect and military carriage, and all this without distaste for the exercises that produced these results. Voluntarily, for hours after the regular gymnastic drill was over, the men would be found at work on bars, swing, with clubs, dumb-bells, boxing-gloves, or any of the rest of the apparatus, as a means of pastime or recreation.

Again,—a mistake is made at the very outset of our soldier's career, by detailing him as an assistant cook in the kitchen, before he has learned his military duty. The kitchen must have cooks, but the recruit, if he be worth his salt, has some ambition

to be a soldier and to be in ranks with the rest of his comrades. I would insist therefore, that the recruit be left out of the kitchen until he has learned from observation that the kitchen duties are as much a part of his education as are his manual and marching drills. This would not preclude his detail in turn as daily kitchen police, but it would preclude his detail as a permanent assistant cook. He would learn to be a soldier first and a cook afterward.

The same may be said as to details on extra duty in the quartermaster or commissary departments, or details of a permanent nature at the stables of our mounted organization. Let such details follow and not precede the proper military instruction. Then an organization at inspection need not be entirely demoralized by the presence of a number of undrilled extra-duty men, who are only in ranks for such inspection, and who by their awkwardness and ignorance throw the rest into confusion.

Year after year we find the men being put through elementary drill as the beginning of the season's work. Old soldiers as well as recruits must go through this A B C work at squad drill, company drill, target practice, or whatever it may be, *ad infinitum*, and most decidedly *ad nauseam*. Why cannot we go on and upward each year? Why cannot we use what was learned last season as a stepping stone to something new in this one? We do not have very far to go for our answer. The root of the evil lies in the routine and perfunctoriness of the first instruction, in the too great haste to make old soldiers out of recruits, and the consequent want of knowledge of the rudiments on the part of all. If the recruit were kept as such until he knows his recruit drill thoroughly before being made a full soldier; if he could be given to understand that his success depends upon his ability, and that the more and the quicker he learns, the sooner he will be put in ranks; then he would have an incentive he now has not, and would never have to go back to his rudimentary education. Let him be taught that the possession of his musket is an honor to be sought for. Let him know that when he has taken his place in ranks he will not have to return to recruit duty, but will always progress toward complete knowledge of his duty; then he will always be alive, awake, and full of the desire to excel and progress.

We find him at last with a rifle in his hands, and ready to learn its use. Here a certain amount of theoretical knowledge of a practical kind does not come amiss. This too can best be

given when the man is out of ranks, at ease and quiet in his quarters. He is not to be preached at with high-flown and scientific words that go far over his head and produce no effect upon his brain. If his muscular development has been properly looked after he will find but little trouble or fatigue in handling his rifle. Gradually he may be brought to any degree of proficiency and dexterity that may be desired, but he should not be compelled to hold his piece in some constrained position in the mechanism of the motion while each and every man is being corrected. How well I remember the aches and pains of manual drill. How well the absolute impossibility of holding my piece in some new position while the squad was corrected man by man to take the right one.

Manual drill is but a means to an end, and that end is uniformity. Precision and a certain celerity are doubtless to a certain degree essential. They aid insensibly in discipline, and in the *morale* of the organization, and the men finally come to take great pride in their appearance and excellence in this particular. There is danger, however, of getting the idea that such precision, excellence, and fine appearance, are the end and aim of a soldier's education, whereas, he has but just begun his duties, and has yet much to learn before he can be called upon for hard, common sense and practical work.

There is also another habit which I think very deplorable. In our winter season, at posts where the climate prevents other duties or drills, it is thought essential to the welfare and discipline of the command to practice the men daily at the manual. Day after day, for at least an hour, old soldier as well as recruit must stand up and grind away at the same old thing. Weariness and disgust prevail not only with the men, but with the officers as well. After a certain degree of proficiency has been attained there is absolute retrogression.

As an exercise, doubtless the manual has its value. In the want of proper gymnastic apparatus it may be well to make use of it for a certain time each day; but I believe that a short, sharp drill, not to exceed fifteen minutes in duration,—a drill made as varied as possible,—will do more good than the hours of routine and perfunctory drill now so often seen. The time that is saved can be utilized for other things useful for the soldier to know.

As an exercise, the bayonet drill has its value, and no matter what may be said as to the usefulness of the bayonet, its exercise

doubtless teaches dexterity in the handling of the rifle. But here again, the drill should be short and sharp. At first it is absolute cruelty to force men to hold the rifle at "guard" while movements and new positions are being explained. The instructor need not fear that lack of attention or want of discipline will follow his allowing the point of the bayonet to be dropped to the floor or ground while he explains a new movement. But many through thoughtlessness, hold their men at a "guard," or some yet at a thrust, a lunge, or some other difficult position, until all the pieces are in the correct position, thereby entailing much severe strain, and consequent disgust on the part of all.

The recruit having passed through his squad and manual drill is placed in ranks with his company, ready to learn a full soldier's duty in company and battalion drill. The daily drill, the manual, etc., conduce no doubt to a certain amount of endurance, but they certainly have not hardened him to marching condition. Has he learned to march with a loaded knapsack on his back? Is he in proper training to take the field? Although men when judiciously handled soon harden down to marching condition, even when they start out soft and green, should we not pay more attention to the practical, and less to the ceremonial, part of our education? Should we not drill more per day, working more for practical efficiency and less for show and inspection?

In the days of our Indian troubles there was more practical work. Regiment after regiment was in the field, and on the march, in camp, in Indian fight or skirmish, learned something practical and positive of the grim Art of War. Parades, ceremonies, music and noise, were then thought of little value, and the soldier learned the meaning of field service, hardship and exposure.

Now that for years such service has been but little called for, it seems to me we are losing sight of the practical, and are drilling and working for the purely ornamental and theoretical. True, we now have each year our practice marches and autumn manœuvres. Doubtless these are and will be of the greatest value, and should be encouraged and developed to the utmost. But it is in garrison that the foundation should be laid for success in the field. The one should be the full supplement and complement of the other. Now, indispensable as company and battalion drills are, they by no means form the whole or even the greater part. Besides marching, the men must be

taught the duties of camp life, and where better can they learn the rudiments of this than in garrison? Tents must be pitched, and pitched properly, in rain, storm, and wind, as well as in calm. The hurry of camp formation, after a long, hot, dusty march, when all are tired and cross, is not the best time for instruction. This instruction need not be made either burdensome, tedious, or long. The idea once caught will be retained and the men all the better fitted for field service, and for placing themselves rapidly and properly under cover when the day's march is over.

Camp must be struck and wagons loaded as well as the reverse. Compact packing and the proper stowing of the load are not learned in a day, and the hurry of breaking camp and preparing for the day's march is not the best time for instruction.

Fascines, gabions, and mantlets, are often needed in actual war. Works of a semi-permanent nature have often to be thrown up. When the emergency arises the knowledge requisite for the construction of such things properly and rapidly should be at hand so that the construction may not be delayed by the necessity for instruction.

One of the most important things of all is a proper fire discipline. We drill, and drill, and drill, until the men are as steady as machines in their various manœuvres, but it is almost always without the noise or confusion of burning powder and its accompanying smoke. The drill is conducted as drill simply, and very rarely are the manœuvres executed as though in face of the enemy. The men do not load and fire, and all is as silent as though powder and lead were never the accompaniments of such manœuvres. The men must be taught the noise and confusion of battle in every way that is possible. Suppose that during our battalion drills the men be taught gradually to hear and stand the noise and smoke of firing without excitement. All successive formations can be used for just such a purpose. The benefit to the men is beyond doubt, and they learn also to obey orders in the noise and smoke as well as when all is silent.

Again. When are our drills ever conducted on ground other than the smooth even parade? Do we ever teach our men the proper use of cover? Do we ever seek out the roughest ground available and teach the men there? Battle-fields have this very undesirable quality, and yet we drill as though we never expect to find anything but smooth, open meadows for our actual fighting.

(To be continued.)

Reprints and Translations.

A SUMMER NIGHT'S DREAM.

Translated from the German

BY CAPTAIN GAWNE, FIRST ROYAL LANCASHIRE REGIMENT.

(Reprinted from the United Service Magazine, London.)

INTRODUCTION BY COLONEL MAURICE, R. A..

PROFESSOR OF MILITARY HISTORY, STAFF COLLEGE, ENGLAND.

This pamphlet, when it appeared shortly before the issue of the new German regulations for drill, excited a great amount of attention in Germany. It has led to a series of answers, some of them written by very able men; and the author has replied to these. On the whole, however, the feeling of most of those who have read the original paper and the replies, is that in point of argument the writer of the present paper has a good deal the best of it. In any case, he gives expression in a most graphic and lively form to certain anxieties which many soldiers of all armies have for some time past entertained as to the present condition of tactical training.

In the second of the three parts into which the paper may be divided, he describes with vivid force certain scenes which he himself witnessed during the 1870 campaign. It has long been known to many of us that the writers of the Prussian Official History by no means told, in regard to that campaign, all that there was to be told. It was not their duty to do more than they did in that respect. We have, however, here certain facts which it is of the greatest importance to us to know, none of which have been told us with equal frankness by any of the numerous writers who have given their personal experiences of modern war. Seeing that, as Lord Wolseley long since declared, it is upon these experiences alone that sound conclusions as to our future mode of fighting can be founded, it is of the greatest importance to us to ascertain as accurately as possible what did happen.

Independently of its tactical interest, this pamphlet throws many side-lights upon circumstances in the German Army little understood beyond its ranks.

From all that I have now heard of what others—whose judgment is decisive—say, I am confirmed in my own conviction that no more important study of the conditions of modern war has been published since the campaigns of 1870.

THE conversation had lasted for a long time. At last Colonel Hallen brought it to an end with these words:

“In short, we suffer from a conflict of principles. As long as that is so, we shall never arrive at a true development of our attack formation. We wish to keep up the discipline of our firing line, and at the same time we wish to fight in dispersed order. We accustom our men to pay the greatest attention to their leaders, and at the same time impress on them the fact that in war they must act for themselves. We try to retain control over the troops and over their fire as long as possible, and at the same time recognize that the mixing of units and confusion are unavoidable. Our desire for discipline and our love of dispersed order pull us in opposite directions. We are involved in a vicious circle, and are groping in the dark because we have no fixed object in view. We are, therefore, content with half measures.

“Two alternatives are before us. The first, to remain true to the old love—that is, to surrender order and discipline in the fight, and cease to accustom the skirmishers to the guidance of the leader. Under this system,

we accustom the infantry to fight in disordered masses. We train the individual to independence and rapid decisions. In all manœuvres, we train the men to think that crowding and the loss of all guidance is unavoidable. In short, we organize disorder. The idea has little that is attractive in it, at least for an old soldier such as I am.

"The other alternative is to give up the attempt to control crowds which have neither discipline, regularity nor leaders. We must, then, altogether forsake the dispersed formation and accept as our principle—cohesion, not dispersion; mass, not individual fighting; separate units, not mobs. Then there will be no need to organize disorder; but there will be a determined repression of disorder.

"I have explained to you before the means by which I believe this goal may be reached. If these means are wrong, others must be tried. If we strive to attain a clearly defined object, the necessary means will soon be found.

"We have now gone so far that we must come to some decision. The choice cannot be difficult. In fact, we have already, although unconsciously, chosen and chosen rightly. Read to any Red Indian the paragraph of our Infantry regulations referring to the education of the skirmisher. It embodies the experiences of the Napoleonic wars on skirmishing. Doubtless the Red Indian would heartily approve of this paragraph, and assure us that his young men could not have better principles for their education as independent warriors. After this, take him to a barrack square or drill ground, and the child of Nature will look about in vain for such independent warriors. He will only see soldiers who dare not leave their places, men who only do what their leader commands.

"In fact, we have already practically, though not willingly, given up the dispersed fight. Yet we are still so confused in our ideas that any one pleading openly for the abolition of the dispersed fight, and the introduction of firing lines in close order, must expect at first to meet with assertions that his views are unsound.

"The present style of fighting is called the 'dispersed but regulated' order. It would be almost impossible to express more clearly the inconsistency of this conflict of principles. Would it not be more truly described as the order 'not dispersed but unregulated.'

"Now, my friend, I have startled you, perhaps irritated you, but—*tu l'as voulu Dandin*. I entered unwillingly on this conversation; but now that I have done so I do not regret it, though you are the only man who could have induced me to speak out.

"You will not think me mad. I can even trust your friendship not to reject at once the views so suddenly and unexpectedly put before you, but even, at my request, to think them over. We will resume the argument some day or other.

"Now I must stop; it's very late, and quite time for us to be in bed. Good night."

So saying, my old friend Col. V. Hallen stood up and shook hands. We had had a long and heated conversation.

I was put out, sulky and perplexed. I could not at once think of the

right thing to say. Silently I gave him my hand, and turned to show him to his room; but he would not let my hand go, and laughingly added, "Now, think over what I have been saying."

Looking at his honest old face I forgot my annoyance, and said, "Yes, Hallen, you have surprised me. That such a gulf should be fixed between your ideas and mine appears impossible to me. What the devil put such ideas into your head, and why did you never say anything to me about them before this evening?"

"Oh, I'll tell you all about that some day," answered my friend, with a laugh, adding more seriously, "As to the gulf, it's not such a big one as you imagine."

We parted for the evening, I promising my friend to resumé the conversation on an early day, and to show him that I had thought the matter over.

My brain whirled. Perhaps I had taken more wine than was good for me. I was not at all satisfied with myself.

During the entire conversation I had maintained an attitude of hostility towards Hallen's theory, and without going deeply into it, had only uttered short, hostile, and often sarcastic contradictions. Now I found myself alone, I began more and more to admit, that probably I had never heard anything better worth considering, and that some part of what he had said had occurred to me before. What had seemed new and astonishing to me was at all events the result of earnest reflection, and therefore worthy of my best attention. The ideas which had repelled me during our conversation now attracted me irresistibly. This often happens with argumentative people. I thought I might have repressed some of my sharp answers, and could have agreed with many of Hallen's ideas. I felt I had had the worst of it, after all.

Hallen is my oldest and best friend. We were subalterns together in the same regiment. Later on, the usual fate of soldiers separated us; but we still remained in unbroken sympathy of thought.

After a three years' separation he had come to spend a few days with me. What had we not to talk over and to relate? In three years a great deal happens among officers of our age. Old soldiers cannot help grumbling. But, besides our grumbles, we had much to discuss. The increase of the army, the new infantry equipment, the repeating rifle, the new musketry instructions, the field exercise, the changes in the drill regulations. No one can say we have rested on our laurels during the last two years, and it is encouraging to see that those in authority are as averse to an apathetic halt as to an incautious rush.

No other subject has, however, for two fanatical infantry soldiers the charm of field tactics; especially when the two fanatics belong to different army corps. What is your normal attack? Have you a preparatory and a final stage in your attack? Do you make a practice of mixing up units? A thousand such stock questions and ideas were started; the discussion of them, always raising fresh questions and answers, is as interesting as useful. The infantry staff officer, promoted into another corps, who tried to bring with him the practice of his old corps or his own private methods,

would have a rough time of it at inspections, and would very soon give up the attempt to go against the stream, not without having suffered for his pains. Of course all this is a necessary consequence of the present ferment in tactics.

As usual, we had gone over all this ground in our talk. We had always liked these friendly exchanges of ideas, and, till now, had always talked without reserve. This time, however, to my astonishment, Hallen was keeping something back. Of this, as the day wore on, I became more and more convinced, and, further, that it concerned a subject as to which I had least expected any reserve on his part.

The question of the day is, What influence will the repeating rifle have on our fighting formations; and nearly all the tactical considerations I have mentioned hinge on it. But whenever I approached this subject, I met with no response. Hallen would either deftly parry my remark, or pass it off with a joke, and start some other subject of interest. I knew his skill in that way, but had never experienced it before in our confidential chats.

Formerly, we had had no great differences of opinion with regard to our infantry fighting formation and training. Neither of us had ever been great admirers of the Regulations.

I resolved to discover, at any price, the reason for my friend's reserve, and to make him speak out, not merely because the tactical question was important, but still more in the interest of our friendship.

I succeeded in this. After a pleasant supper, we had come home and enticed by the beautiful warm summer night, sat drinking our wine in the verandah. It is at such times as these that a man opens his heart.

"Hallen," said I, as he again tried to evade the question when it cropped up, "you are not acting honestly by me; you are keeping back something. Why will you not tell me what it is? Even if my views have no value for you, that is no reason why you should keep back yours from me."

"Don't be a fool," answered Hallen. "If there are certain subjects about which I would rather not talk, it is only because my views are too peculiar to suit our usual conversation. I do not want you to say, 'Spare me such crack-brained theories.'"

"I very much doubt your having strange ideas, my dear Hallen; but, even if so, you might tell me what they are. Perhaps I shan't find them very strange, after all. Or," I added, laughingly, "are you going to turn 'author?' I am afraid you are writing a book, and wish to startle me with it when it appears."

"I write a book!"

"Yes, you have the ability; and now I think of it, I only wonder why you have not done so before. You speak like a book, why not write one? When a man begins to think for himself, he generally ends by going to the publisher."

"I do not know if I speak like a book, but I know that I cannot write one; otherwise, I should have done so long ago."

"Didn't I say so? I see that you have had such an idea in your head.

Perhaps you may yet carry it out. And what will be the name of the book?"

"What will the name be? 'The art of hiding Crowds—the Plague of the modern Battle-field;' that title will do," answered Hallen, laughingly.

"Bravo!" shouted I. "Certainly the book will create a sensation. At all events, the title will do so, and the contents also, provided they contain a prescription for the proper prophylactic against the plague."

"You mean, my dear fellow, that the chief duty of a physician is not so much the cure of illnesses as their prevention."

"And have you such a prophylactic against this plague, which we all know and detest?"

"Yes; I think I have."

"Well, out with it."

"It is 'abolition of extended order.'"

"I have another," laughed I. "'Abolition of nerves.'"

"Quite right," said Hallen, still joking. "Your method is good; but it is no medicine, only an effect which will follow upon the use of my medicine. You believe both impossible," he added, "I, on the contrary, seriously believe that these sensitive 'nerves' will, under certain conditions, cease to exist. These conditions are abolition of the crowding together of different units in the fight, and the introduction of close order formations; freeing our fighting tactics from the weaknesses which a false and sentimental humanity has introduced; and the restoration of the 'bloody energy of war,' to quote the late General V. Ollech's words.

"Did you ever hear of Frederick's men having nerves? I think any of his officers who had nerves would very probably have been cashiered on the news reaching the King's ears. And if the officers do not have 'nerves,' neither will the soldiers; that is to say, soldiers fighting in close formation under the eyes of their officers."

"You would not have us return to linear tactics?" I asked, in astonishment.

"Not return, but *advance*," answered Hallen, quietly. "The old linear tactics are dead, but a Phoenix may arise from their ashes. Rejuvenated linear tactics, suitable for modern fighting, and consisting of handy single ranks, with no depth of formation."

"But, Hallen, those are not linear tactics."

"Call them what you will. What presents itself to my mind is the regulated mass-fire of lines in close order. In these lines, the 'Zug,' in single rank will form the fire unit."

"Lines in close order!"

"Yes, lines in close order; but flexible lines, well accustomed to manœuvre in the open field. Now, you have made me say so much that you must listen to me patiently," added Hallen, with that friendly earnestness which characterizes him.

I listened with astonishment.

"Have we, at present, the old extended order—I mean that created during the memorable wars of the French Republic and the First Empire, and afterwards introduced into all disciplined armies? No, it exists no longer.

“The extended order was an accompaniment of the close order formation, but the less important of the two for battle. Indispensable as the extended order was, still it was never more than an auxiliary to the close order. The battle was only prepared by the fight in extended order, but not carried out by it. Either the fire of lines, or the bayonet charge of columns, decided the battle. The masses in close order surrounded themselves with skirmishers as with a cloud of smoke. These skirmishers hid from the enemy the movements of the closed bodies. They kept away the mosquito-like fire of the enemy’s sharpshooters, and pressing forward up to the enemy’s very noses and eyes, they blinded, confused and shook him. Such, was in those days, the task of the skirmishers.

“Only a small portion of the infantry was given up to the skirmishing fight. In France, the skirmishers consisted of a company to the battalion; in Prussia, generally of a sixth to a third of the whole force. The most active and dependable marksmen were picked for this purpose, and specially trained. The work of these marksmen was inseparable from that of the masses in close order, to which all their movements had to be subordinated.

‘To-day the so-called ‘extended order’ rules the infantry battle entirely. The modern fighting-line unites in itself both the old preparatory fire of the skirmishers and the decisive massed fire of the line. It even takes the place of a portion of the shock power of the old columns. It has passed from dependence to command. This decisive, all grasping force dictates the movements of the reserves. These latter are now no more than reinforcements for the fighting line. Their real work only consists in moving up sooner or later into it. The present ‘extended order’ demands not only portions of the infantry, not merely specially instructed men, but the entire infantry. Formerly, when extension began, by far the larger portion of the troops were retained in close order. In this way you preserved the certainty of having united and concentrated force for the decisive moment. The bodies in close order always gave a rallying point to the skirmishers. The extension was always only for a fixed time, and had a fixed object. As necessity arose, the skirmishers were withdrawn and absorbed again into the masses in close order. Thus, for instance, when the line in close order began to fire, the skirmishers fell into the ranks. They were again thrown out when the enemy had to be followed. And so arose a continual alternation between extension and close order. This alternation has now disappeared. There is now only the extended order, which increases in volume up to the end of the fight. The re-formation, which is practised during peace, appears to be almost impossible in actual fighting. If a man knows where his company is, it is easy for him to reform. When companies and battalions dissolve and intermix with other troops, or what is the individual to reform? Attempts enough were made on our battle-fields to collect the masses of stragglers, but how seldom were they successful. How pitiful was the result of such attempts generally, in comparison with the thousands and thousands of the stragglers who covered the battle-field? Even when officers succeeded in collecting a number of men of different regiments, and in bringing them up again to the front, it always happened

that as soon as they were again extended under fire, the mob, without union in itself, promptly lost all cohesion.

"Am I not right? Am I painting matters too black? What you, I, and many of our friends know about this was sometimes even worse than I have described. The extension of masses is the evil soil in which the poisonous plant, the men's habit of hiding themselves away, flourishes so luxuriantly, and unfolds its ugly flowers."

"What then were the advantages of the original extended fighting formation?"

"One advantage was that the enemy had only a few men to fire at. This advantage has disappeared. The present thick firing lines give masses to aim at. The second advantage was that each man's shots could be better delivered. Fire was then at short distances. At 100 to 150 paces, our marksmen could choose the proper moment for each shot; when, for instance, one of the enemy's skirmishers exposed himself incautiously, when a bead could be drawn on one of the enemy's leaders. To do this, it was necessary to allow the skirmisher a free hand in firing; otherwise, the best chances would be lost. It was then quite right that he should select the best cover, and so creep up to the enemy. The only limit to his freedom was the rule that he was not to interfere with the fire of the others. The skirmisher was then a really independent warrior. To-day, the fire begins at 600 yards, and sometimes even at greater distances. The skirmisher sees nothing more of the enemy than a line of little clouds of smoke. Can he aim at any individual, or pick off the officers? He can only aim at the mass, and success can only be attained by the fire of the mass, not by that of the individual. If, however, now-a-days, you are so near the enemy as to be able to aim at individuals, this approach signifies either that the battle is already decided, or that it will be decided in a very short time. There cannot possibly, with aimed fire at distances under 250 yards, be a fight of any long duration in extended order. When that time arrives, the only prospect of success lies in a short but intense fire of masses, followed up by the bayonet charge. Again, it often happens that in calm weather the smoke completely envelopes a thick firing line. When that occurs, what becomes of the special advantage of extended order in the more convenient delivery of each separate shot?"

"It is quite proper that now-a-days skirmishers should be to some extent deprived of their former freedom in opening fire, and in using independent firing. The leader endeavors to keep the control of the fire as long as possible in his own hands."

"If, after the order 'Lie down!' has been given, a skirmisher discovers, two paces in front of him, a favorable cover for himself, may he make use of it? No; because, with the present density of the firing-line, he would hinder the fire of the men alongside of him. What then remains distinctive of the old skirmisher? Nothing. Our present skirmisher is something very different from the skirmisher of the original dispersed order. The former was really a man fighting independently; ours is a man fighting in close order.

"The advantages presented by the original dispersed order have been

lost. The only point which our extended order has in common with its predecessor is its irregularity. Formerly we had the irregular order for individuals, and there was a reason for its existence, in its association with the main body in close order; but now we have the irregular order for masses, a thing for which there never has been any justification since disciplined troops first existed."

"You say 'all the advantages of the dispersed order have been lost,' I interposed. "Surely you have forgotten to mention a great advantage—apparently not lost. I refer to the use of cover."

"Quite right," said Hallen. "I should have mentioned that before. Formerly this advantage was a great one, as on the one hand, the individual skirmisher could seek cover for himself within certain limits; on the other, the masses in close order scarcely knew anything about utilizing cover. Neither of these conditions exists to-day. The skirmisher, placed in a dense line, has in reality no more freedom in choice of cover than the man in close order. He may not leave the line either to go forwards or backwards to seek cover, and he can't go to either side on account of his comrades. We have, however, made great progress in discovering cover for formations in close order. The best way of avoiding the effect of the enemy's fire is to lie down, and troops in close order can do this as easily as firing lines. Our company columns are skilled in the art of utilizing natural features of the ground to approach the enemy unseen. Close country, bushes, woods, vineyards, are indeed no longer obstacles to supports. I do not assert that there is not still room for considerable improvement in these matters, but we are on the right road. The formation in close order, which I believe to be the best for the firing line, is "*Züge*"* in single rank and close order, which will fire lying down. What disadvantage has such a formation in the use of cover, in comparison to the present extended order formation, always more out of hand and seldom less dense?"

"You continually speak of the density of the firing line as if this density was one of its constituents," said I; "but you don't always have dense firing lines. As the Regulations say, you can begin the infantry attack or defense with skirmishing lines, and as the battle becomes hotter gradually increase their density."

"I do not dispute," answered my friend, "the value of thin lines of skirmishers where no serious engagement is intended, or where you only wish to throw out a veil either for observation or security from surprise; though in such a case I should prefer using patrols. But if you are going to commence your attack with so thin a firing line as to have five or six paces interval between files, your skirmishers will indeed have smaller losses, but your troops in close order greater losses. The enemy who oppose you with a dense firing line will have, with an equal front, twice or thrice the number of rifles in action. Your reinforcements, on their way up, will be insufficiently protected by the firing line, and will be annihilated. You will not, therefore, lessen your losses by such a course, and this great extension of the firing line will render fire discipline difficult from the outset. The

* There is no exact English equivalent. A "*Zug*" is one-third of a company.

worst of such an attack would be that 'crowding' would become the rule, the mixing of units a system, and the 'mob'—the deadliest enemy to leadership, and the greatest friend of skulkers—would be permanently established and habitual."

"I have no liking for such business as this; besides, old man, you know, you yourself do not care for this organized disorder."

"Finally, the object of such an attack is to reach the deadliest range with as dense a firing line as possible. Why is it," continued Hallen, "since we enjoy none of the benefits originally introduced by the dispersed fight, that we still remain faithful to it and its defects?"

"It seems," I replied, "as if your chief objection was to the name 'extended or dispersed order.' I quite agree that it is no longer a good fighting formation for skirmishers. Remember the musketry regulations recommend the keeping together of 'Züge,' in the firing-line, and tacticians wish now to have always the section or half-section regarded as the 'fire unit.'"

"You mean that the whole matter is a mere question of splitting hairs, and that after all we only call the same thing by different names?" asked my friend, in his usual quiet way. "Now you astonish me. I thought to meet with the strongest opposition, and you tell me there is nothing new in what I say. According to the tactical views generally accepted, you can only hope for success by adopting the extended order when under hot fire. I, on the contrary, say you must use close order. Is there really no difference between the two?"

"Certainly, there is a tremendous difference," said I, dryly.

"I do not wish to be misunderstood in my use of the word 'close order,' which seems to me the key-word of our future fighting formation. I do not wish to use columns, as we did till very lately, against the modern rapid fire. Neither have I any wish to encounter the fire of an enemy by taking cover, with the old line. The old line was too clumsy to utilize ground, and too proud to lie down. My close order system is to have engrafted upon it all the artifices for gaining cover which we have learnt from skirmishing. These must be unceasingly perfected. That is, in fact, the great service which skirmishing has rendered to the development of tactics."

"Excuse my interrupting you. But you say our skirmisher is a man fighting in mass formation. That flatly contradicts everything on the subject in the Regulations and also the views of our most distinguished writers on tactics. Even if the influence of the leader at point blank ranges has often no effect on the mass of individuals, and if success depends solely on what the firing line may itself resolve to do, still the man is not fighting in mass. He must be taught to act independently, or when the time comes he will be found wanting."

"Yes," answered my friend, seriously. "I know that accepted theories, and the views of those in authority are against me and this fact has caused me many a sad hour. I agree that there are times when the best disciplined troops get out of hand, but I cannot agree that it is impossible to overcome such moments of weakness, if the leaders only do their duty thoroughly."

"When such a fit of madness seizes the firing line, where, I ask, is the leader's whistle? and if he has fallen, where is his successor's? and if even he also has bitten the dust, where are the sergeants and section leaders? Where again, I ask, are the leaders of the companies on either side of the company in question? They cannot all be killed, or so indifferent to their duty as to allow wild shooting in their immediate neighborhood. If there are men who are stupid enough not to pay attention to the repeated shrill whistling, and to go on firing, what are the Zug leaders about if they do not knock the rifles out of the hands of such men? Are there not everywhere brave men who will prevent such conduct on the part of timid comrades? Finally, where is the officer's sword, which, when other means fail, must enforce the necessary prompt obedience?

"I believe a thorough fire-control to be such that it can insure the cessation of fire, necessary to allow smoke to clear away, to keep the men cool and to allow of their hearing orders whether to resume the firing or to advance. We have now the means of permanently creating such a control, if only men are strictly trained to it.

"The regulations and views in opposition to me are founded on the experiences of the last war, where the means of controlling fire were insufficient, and ideas on the subject were less clear than they now are. At that time that invaluable aid to a real fire-control—the whistle—had not yet been introduced. The order, the signal and call of the leader perished in the unsuspected severity of the din of the firing line. I once shouted with all my might in the ear of a man in the firing line alongside of me without making myself understood. The man was to advance a pace, at a moment when he had the muzzle of his rifle dangerously close to a comrade's ear. As neither words nor gestures availed, I finally dragged him forward by the collar.

"As it was impossible to insure pauses in the fire, every shot increased the general confusion and the smoke. If an officer sprang forward, at most the two or three men in his immediate neighborhood followed him. The others saw and heard nothing, and continued firing. And so the poor lieutenant and his few trusty followers had shamefacedly to fall back, or endure a fire from both sides. More often than not, the firing line consisted of a mixture of men from many different regiments. I have even seen men with yellow and red shoulder straps* mixed up together in the same firing line. In such a case, the leader does not know what men he commands: the men, whom they are to obey. Certainly the present means of enforcing fire discipline are most satisfactory!

"A way out of the difficulty, which arises from the mixing up of firing lines, may be seen at peace manœuvres. It consists in distributing the men afresh among the leaders actually present. This would be impracticable under a hot fire. Even if, under exceptionally favorable circumstances, such a process were carried out, it seems extremely doubtful if it would be thoroughly successful. A strange leader will not have the same influence over the men as the officer they know.

* This implies a mixture of men of different corps..

"Is, then, the retention of dispersed order tactics, with its inevitable admixture of units, desirable? If so, people are justified in thinking that a thorough fire-control is impossible. I contend that, under certain conditions, a permanent fire-control is possible. These conditions are: the firing line to consist of Züge in single rank, the strength of the Zug being not greater than fifty men. The Zug must be taught always to close in to the centre so as to make mixing impossible. You cannot crowd into a closed Zug. Finally, when a leader falls, his place must be instantly taken by a successor. I have thought out this idea thoroughly, and can find no flaw in it.

"The assertion that volleys are impossible under severe fire may be dealt with similarly. This assertion was in every one's mouth after the last war, and is still frequently heard. Certainly volleys were impossible in the French War. But why? Because the noise of the firing line overpowered the command to fire a volley. One could have known that beforehand. Even with muzzle-loaders it was held that a line of skirmishers could not fire volleys. When the line advanced to fire volleys, the skirmishers were withdrawn, to prevent the noise of their fire spoiling the volleys. It was after the introduction of the so-called 'small volleys' during peace time, *i. e.*, before the last war, that volleys in the firing line were called for. Volleys are only possible when their use is universal; then they are more easily executed, even under heavy fire, than is the recent 'stratified fire,' the name I give to your independent firing with a fixed number of cartridges. I think volleys should always be by sections, even when the company is in two ranks.

"You can only fix the number of rounds to be fired independently when a pause in firing occurs. But, giving such a pause, it is possible that the old words of command, 'Present,' 'Fire,' might produce a steadier and more certain fire than the order, 'Two rounds independent firing.' Who will answer for a man, in the heat of action, not using more than two cartridges? Can you at such times watch each individual? When the number of cartridges is limited and the fire exceeds the proper limits, then the leader's whistle must be used to obtain a fresh fire pause.

"Independent fire must not be allowed for any length of time without fire pauses, or it will lead to an unsteady losing of ammunition. Why, therefore, name the number of cartridges to be fired? It is an old military maxim that no order should be given, of which the execution is doubtful or cannot be controlled. If volleys are not to be used I would only give the word 'Independent fire,' and insure pauses by the use of the whistle. The new fire regulations have, in fact, done away with the firing of the number of cartridges for independent fire.

"It is an error to suppose that independent fire causes more injury to the enemy than volleys. That fire is the most fatal in battle which is most quietly delivered and is least obscured by smoke; that fire is the volley."

"What," I cried, "after educating our men with the greatest trouble and labor up to a standard of individual independence, which excites the envy of other armies, will you again make them the machines they were in past centuries?"

"Machines! yes," said Hallen, after a little reflection, but with much emphasis. "If Frederick's grenadiers were machines, I should like to have such machines, which, come what might, would, like a machine, work on as long as there was steam in the boiler. Such machines continued firing even though half of them lay bleeding and dead on the ground. Oh, my friend, would that we could only again attain the fire discipline which then excited the admiration of the world and was the terror of our enemy.

"But," continued he, "universal service gives us now a better metal than the iron of which Frederick's warriors were composed. The careful attention to the individual, which you just now mentioned, may convert this metal into the best steel. It will make the machine more flexible, omnipotent, and perfect. I mean we are not to neglect the individual education of the soldier. We are not to take less trouble in awakening and strengthening the thinking power of the man. Neither should we omit to educate him in that independent action which our company training gives the man in patrol and outpost duties, in skirmishing, and in shooting. We need patrol leaders, and we also must have a great number of privates capable of replacing in war time, and especially in battle, the corporals and non-commissioned officers who fall.

"In reconnaissance, on outpost duty, in skirmishes between small bodies of troops, in close or wooded country, the real dispersed fight will still occur. But on the drill-ground or at manœuvres where the fight is practised, not of patrols, or of companies, but of large bodies of troops, there should be nothing heard of individual independence and of individual fighting. Any attempt to go outside the limits of the common task should be sternly repressed. The units must be held together with inexorable firmness: and, having got rid of the false humanity which has crept unnoticed into our style of war, we shall then erect on the foundation of our incomparable discipline, luckily still unshaken, a fire discipline unattainable under the present conditions."

"What do you mean by the 'abolition of false humanity' in our style of war?" I asked. "Your ideas are so strange to-day, that perhaps you would like to reintroduce the stick and running the gauntlet?"

"Do not misunderstand me," answered Hallen, calmly. "Frederick's rough iron could only be kept in a good condition by severe means, which are not applicable to better materials. Now-a-days the sense of honor nobly replaces the stick. I would change none of our punishments. I should, however, like a little less dry-nursing of the ranks. The false humanity of which I speak is less common in peace than in war. To make my meaning clear I will give you two extracts, written by our great Scharnhorst, even before 1806. I take them from Von Der Goltz's interesting memoir, *Rosbach und Jena*. I can quote them by heart, so often have I repeated them to myself. The first is: 'Whatever method you may take to raise and kindle courage, courage should always be put in the first place; the brave men must be distinguished on every occasion, and any ambiguous conduct must be covered with shame. Failing these requirements, it will be vain to expect any great deed of arms in this age; and, further, there will be danger of creating nervousness and want of courage. The

moral attributes are never at rest; they fall as soon as they cease to rise.'

"Now I think we are not wanting in rewards for courage and distinguished conduct in the field; but how about the attention paid to dealing with doubtful conduct and the punishment of cowardice? The second extract from Scharnhorst reads: 'Of late, punishments in most armies have taken a peculiar turn. If a soldier quarrels with a comrade, a peasant, or clerk, he is punished severely, but we overlook his throwing away his arms after a defeat or leaving the battle-field before his comrades, and the like.' What officer, who had a company in the last war, does not feel the point of these lines come home to him? Certainly we did not reach the stage of throwing away arms after a defeat, but, on the other hand, how many cases there were of men leaving the fight before their comrades! These men would press themselves into a furrow or behind a bush, lay down their arms and knapsack, and wait in security till the fight was over. Which should be punished most severely—the throwing away arms, when all is lost and fear benumbs the limbs, or the sneaking away and laying down arms while comrades are advancing victoriously?

"Some time ago I heard a story, which I must quote at length, not because it is singular, but because it is typical. A boy officer is on outpost duty before a French fortress with his half Zug. He hears a sharp musketry fire in his front, and resolves to advance his picket to the edge of the wood before him, as he will then be able to see some distance. On the way a sergeant, an old one-year volunteer, asks permission to go back and get his great coat, which he has forgotten. The request is refused. The little picket holds a pit in a brickfield, and is opposed by a line of skirmishers, firing vigorously, but too far off for the needle-guns to be used in reply. The enemy perceives and fires at the picket. The young officer forbids his men to fire, and instructs them to advance to within 600 paces of the enemy. He places himself in front of his half Zug, calls out, 'Double, march!' and runs as quickly as he can to the place whence he intends opening fire. Who can describe his horror-stricken amazement when, on arriving, he sees that but three men have followed him. Shame and anger strive within him. If a superior has seen this! There is nothing for it but to return and bring up his half Zug. Then the men tell him that the sergeant had kept them back, saying he was a sergeant and was not going to advance. The men were to stop where they were, and he would take the responsibility.

"What was done to this sergeant? From that time forward, whenever there appeared to be any likelihood of fighting, he was sent to the baggage guard, and when he was before Paris he was given work in the kitchen. All this cannot have been pleasant to him. The company would not endure the shame of bringing a non-commissioned officer before a court-martial on a charge of cowardice. No; it preferred to bear the secret shame of leaving such a non-commissioned officer unpunished, though he was a bad example for weak men, and caused rage to strong men.

"That is one of many similar cases. There lies the weakness of modern times. I call it false humanity."

"I must tell you," said I, "I think it extremely doubtful whether much can be gained by punishment in such a case. How is it possible, in the course of a modern fight, to know which of your men have really 'skulked'? How can you decide whether the stragglers have remained behind from cowardice or, having been separated from their unit by no fault of their own, have remained behind from not knowing what to do?"

"You could have given yet another reason," interposed my friend. "If things happen in the next war as in the last, the number of the stragglers will be so great as to render their punishment impossible."

"According to the official history, at Gravelotte, on the 18th of August, forty-three companies of different regiments were at one and the same time in the Auberge of St. Hubert. You have seen the farm-house, and know the building is scarcely large enough to contain a single company on war strength, especially when you remember that the low garden was commanded from Moskow farm—and under a heavy fire. Forty-three companies are more than 10,000 men. Where were the 9800 men who had no room? This is another typical instance. No one wishes to reproach these troops; the blame rests on our style of fighting.

"So long as we retain this style, it is useless to contend against the crowding together of masses. Of course, in bygone days, there were men who had no leader, but only when troops had been broken, which meant that the game was over for them. But now this epidemic of withdrawing from the battle begins with the game, and spreading with pestilential rapidity, rages over the battle-field like a fever. The private must have some sense of duty and some courage; yes, even heroic steadfastness—not to follow the tempting example of others—to withstand the charm which every tree, every furrow, every ditch has for him, when he knows he can gain security without risk of punishment. It says much for the sterling stuff in our men that we still have so many heroes.

"When fighting in close order with his own comrades and his own leaders, the soldier will keep his place in the hour of danger without being a hero. Here the weak are supported by the strong; here the power of discipline, the influence of the strict drills in peace time, and the authority of the leader prevail.

"In dispersion it is difficult to be steadfast, in close order it is difficult to be weak. Under the leader's influence, the example of the strong impels the whole. Among the leaderless, the example of the confused and the cowards has the upper hand.

"It is not, of course, impossible for individuals to withdraw from the fight, even when in close formations. The leader cannot always have time to inquire whether all who fall are actually wounded. But to avoid the common danger under such circumstances, and in such a manner, argues a grave degree of insubordination. A man capable of such conduct should be punished with the utmost severity. There will not be many of them, especially when they know that, if caught, no mercy will be shown.

"The dispersed fight encourages natural cowardice, which, to say truth, is to be found in us all," wrote a thoughtful man before Jena. He was right;

still, as we were beaten in 1806, they said he was wrong. Would one still say that to day?"

"Do you consider it possible to maintain close order under a heavy fire?" I asked.

"Certainly," answered Hallen. "Have not Prussian lines, two miles in length, held together and closed up till two-thirds of their number lay on the ground. A well-seasoned company will certainly not fall to pieces till its fighting power is completely shattered. In the moment of danger, a well-disciplined company rather inclines to close up than to disperse. The continual drills in dispersed order now diametrically oppose this inclination. Cease to skirmish in large bodies; teach the soldier to close up at all drills. Call to assistance the habits of discipline and training, which have already been so extraordinarily successful in smaller matters. There will then be no reason to doubt that close order will be maintained under any circumstances, especially in small detachments, which will easily escape the enemy's fire by utilizing the natural features of the ground.

"But many will cry out, 'What losses this will cause!' I know you will have no quarrel with me on this score. I will therefore only make three brief remarks on this point.

"1st. Züge in close order and single rank really offer no better target than clouds of skirmishers.

"2d. That formation will lose least in a fight which can do most injury to the enemy.

"3d. An army which either suffers from or is not quite recovered from the malady of fearing losses must wage no war, for war is pitiless, and regards not the life of man.

"Our national strength does not lie in dispersion, where each man fights for himself. Whenever we have made our mark in history, discipline and fidelity were the characteristics of the German soldier. Though our soldier is accustomed in peace to careful drill, strict discipline, and unconditional obedience, in battle he is confused by disorder, and by the withdrawal of his accustomed leaders. He will do anything which duty and obedience may demand from him if under the influence of his company officer. He will then, with quiet enthusiasm, follow him through danger and fatigue to certain death. But in a crowd he loses his head quickly, and forgets what has been so carefully taught him during peace.

"It is not so with soldiers of the Latin races. Among them, the individual has more self-consciousness and a greater tendency to act for himself. He does not regard his officer as a demigod, he likes to feel himself untrammelled and without a master. Even in the last century, it was recognized that 'the French are most dangerous when in disorder' (*in der Unordnung am gefährlichsten sind*).

"What reason have we for renouncing the strong points in our characteristic style of fighting, and for competing with our Western neighbors in a style for which they are in every way more fitted? Let us leave the *debandade* to its discoverers, and return to the old close formation and to order. Do not refuse to our men what their dependent natures require at the critical moment, viz., the eye and voice of their officers. They will then

show themselves true men when the time comes, not less true than Frederick's Prussians, of whom even Napoleon said they were 'the best soldiers history had known.'"

"But Napoleon certainly did not believe in their mode of fighting being the best," I interposed. "Do you expect your close-order formations to fight advantageously in cramped or wooded country? I doubt it."

"As I have already said, we are no beginners in the art of skilfully moving detachments in close order, either in the open or in close country. This art can and must be still further perfected. Then we shall be able to fight advantageously in any sort of country. By close order, I do not mean any rigid adherence to the letter of the word. For of course you must turn natural obstacles, not run your head against them. My close order will open the ranks when necessary, but close them again when the necessity is passed.

"The temporary opening of the ranks is not the dispersed fight. If troops who know no other style of fighting than close order come under fire while the ranks are opened, as soon as the ground allows of it they will strive to again form single rank sections in close order; and this is exactly what I want. It is precisely in cramped country, that you most need cohesion and dash, since here all the advantages are on the side of the determined attack. Nowhere is extended order, when constantly maintained, more unsuitable and dangerous than in such country.

"Cavalry is certainly a close-order arm, and exactly because it is so it must possess in a high degree the faculty of dispersing temporarily and rallying quickly. If its education is defective in this respect, then it remains dependent on the nature of the country, and can only attack on plains. But if it possesses this faculty to perfection, then even intricate country is no obstacle. It can then rival Frederick's squadrons, who at Hohen-Friedburg crossed the Striegauer River in the face of hostile cavalry, and then, to the astonishment of the enemy, forming into line, gained a brilliant victory. Thirty-one of these squadrons again crossed at Zorndorf the difficult Zabern Bottom, on which the Russian right flank rested; then, forming under fire, they rode down the whole of the enemy's right wing. You will find much that is valuable on this point in Hohenlohe's *Cavalry Letters*.

"The same acute observer, who uttered the drastic words "skirmishing encourages our inborn cowardice," wrote before 1806 a memoir against the introduction of the dispersed fight into the infantry of the line. But of course you know that there is an excerpt from this memoir in *Rosbach und Jena*.

"This memoir says, that even in cramped or wooded country there is no necessity for skirmishing. A battalion advancing through bush and forest must of course open its ranks, and if necessary, let the men march singly. But that is not skirmishing. The spirit of the attack in close order remains still in the battalion. When it meets a line of skirmishers, of whose work it knows nothing, it advances rapidly and most likely beats the enemy thoroughly. Then comes a paragraph to this effect:

"A battalion, however, which has tasted the delights of hiding in ditches

and holes, and thence bravely loosing off its sixty cartridges, will never miss the opportunity of renewing this pleasant experience. It will, whenever a natural obstacle presents itself, leave the ranks instead of advancing, creep into every hole and corner, and bravely fire away, appeasing its military conscience by sound and smoke, and leaving the further attack to others. There may be exceptions, but whoever denies the truth of these pictures either knows nothing of war and human nature, or is governed by prejudice.' "

"The author of this memoir was no prophet. The Prussians were beaten but not, as it is generally stated, because they could not skirmish. They were beaten because their military and political indecision was pitted against Napoleon's war genius; because of the disjointed way in which they brought their forces into the battle and allowed them to be beaten piecemeal, and, finally, because they were unable to do what the writer of the memoir took for granted, viz., to open ranks when advancing through cramped and wooded country while preserving the spirit of close order. We could, in fact, only fight in the plain.

"If at Jena, Prussian or Saxon battalions had at once penetrated the Isserstadts forests and expelled the enemy's skirmishers, the French centre at Vierzeñnheiligen, which was weak and exposed, would have been in an awkward position and might have suffered defeat. But we did not know what to do with a wood. We let the enemy have it. He then, collecting sufficient numbers there, rolled up the flank of our line which had successfully withstood all frontal attacks. We stood perplexed before the villages of Vierzeñnheiligen and Hassenhausen after we had driven the enemy into and behind them, and were in a position to attack with a probability of success. But the storm of a village was something unheard of at this time, and so we remained firing, undecidedly, in front of them till our front was shot to pieces and a flank attack rolled us up. Had we really known what that acute writer considered the true method of fighting in inclosed country; if we had not avoided woods and vilages, though the day might not have been won, yet the brave troops who withstood the frontal attack till every second man was *hors de combat* would have caused the fame of the battle-fields of Jena and Auerstadt to belong to the army and tactics of Frederick.

"If I am not mistaken, it is the Prince de Ligne who compares line tactics to a porcelain vase, which no sooner comes in contact with any object than it shatters. Such were line tactics in that year of misfortune 1806. But the comparison to the porcelain vase is not applicable to the fighting tactics of Frederick's troops. Those troops did not fear either wood or hedge fighting, when they drove the enemy's light troops out of their hiding places into the vineyards of Lobositz, or when they opened their ranks to storm the village of Leuthen and then made a fresh attack on the position behind. Further, we find them in Hochkirch, stubbornly defending the church-yard wall. If, instead of shelving this method of fighting, we had developed farther the use of cover in the field, we should have escaped the general use of extended order, and should have been farther advanced than we are, and I should not have had to inflict on you this long talk about the dispersed fight. The rejuvenated line tactics, which I

believe to be the coming tactics, will only differ from those buried at Jena in resembling india rubber rather than porcelain. They will not prove brittle and crumbling when confronted with natural obstacles, but will elastically accommodate themselves to the ground. This new style of fighting will be simple, flexible, capable of extension, but infrangible, assuming any shape at will, but always returning to its original form. The task of future fire tactics will be to unite the old close order and strict fire discipline with the modern art of utilizing cover. The parts played by villages and woods in the fight will then be reduced to their proper dimensions. In the present century, they have been as much depreciated as overvalued. Formerly, we Prussians anxiously avoided them; now, in the dispersed fight, we fly to them. The tactics of the future will be free from such extremes. They will neither fear nor seek wood or village.

In the late war, at the first whiz of the bullets, an unnatural, almost a suicidal mania, seized our well-ordered troops. They plunged into either wood or village, and there the units, rapidly dissolving, became mixed. I say suicidal—for them as a whole—but there was much individual self-preservation in such conduct.

“Why should disciplined troops prefer village fighting to fighting in the open? Even the most irregular troops, who cannot dispute the field with Regulars, can confront the best infantry in the world in house fighting, for here the advantages secured by superior leadership and training cannot have full play. Here the fight returns to its primary conditions, and every man feeling himself uncontrolled, and with passions unfettered, is capable of the grossest brutality. The decisive blow of the higher commander can only be delivered outside villages. Experience has, therefore, taught us that the ultimate result of street-fighting generally depends on the issue of the battle outside the village.

“Frederick the Great most strictly forbade placing men in houses, considering their use in this way as a cause of disaster. His theory has been laughed at during the period of dispersed fight tactics. People could see no harm in confusion; no objection to allowing every man to fight independently. They shut their eyes to the risk of shutting up troops in a village which, when lost, gave the enemy a crowd of unwounded prisoners. Not the desire for order and unity, but the immense searching effect of modern artillery fire on villages and houses, has lately led to the conviction that, as a rule, houses cannot be regarded as desirable cover. The tactician of the future, as, I think, will agree in the great king's prohibition, but in a modified form. He will allow houses to be garrisoned in certain cases, but never at the option of private soldiers. This does not at all imply that villages will not continue to be of great value to the defense; their value will not lie in the shelter they give a garrison, but in the excellent cover they will give to troops posted behind them. Villages always give good cover for movements of troops. Villages will, therefore, still be included in the line of defense, not with a view to occupying them, but rather in order to use them as cover for the supports and reserves. The firing line will either be placed in the encircling line of gardens, or, better still, in shelter trenches close in front and on the flanks.

"In the attack on a village, care should be taken after driving the enemy out of the outskirts, to concentrate all available forces on its flanks, and so bring about its fall. It is a grave mistake when troops have become disordered by the fight for the outskirts, to allow them, while so disordered, to enter a village in scattered bodies. Only a small force, kept well in hand; should be sent into the village. A house-to-house fight can generally be avoided by a thorough artillery preparation, and by advancing quickly on the flanks."

"I quite agree with you," I said; "but, nevertheless, cases occur where a house-to-house fight is unavoidable, as at Bazeilles."

"Yes," answered Hallen. "Bazeilles is an exceptional case. No fight took place for the outskirts of the village, the two forces met inside the place, and as neither would give way, a street fight was inevitable. Even so, the gradual entanglement of more than sixteen battalions of the Saxon and 1st Bavarian Corps might well have been avoided. Officers and troops educated in my tactics would avoid this."

"The decision of this fight should not have been sought in the village itself. The street fighting would have been decided instantly in favor of the Germans, if the heights north of Bazeilles and west of La Moncelle had been taken. Unluckily this did not happen till the fight had been going on for seven hours, in and around Bazeilles and La Moncelle, and had swallowed up the greater part of the 1st Bavarian Corps."

"Even before 7 A. M., weak detachments from the Saxon left wing had gained possession of some houses close to these heights, and for hours, without assistance, heroically held possession of them against the full force of Lacretelle's division. It was not, however, till 11 o'clock that detachments of the Bavarian right, the Saxon left, and of the reserve, accidentally working together, established themselves on the heights. Then the resistance of the French in Bazeilles at once collapsed. Had the 1st Bavarian Corps resisted the attraction of the village, and directed its chief efforts to the capture of these heights, the dreadful struggle would have been shortened, and the greater part of the infantry of the corps would have been spared the effect produced by it."

"No one wishes to reproach the veteran Bavarian Corps, or its able leader, for having acted in the spirit of the age. I blame only the system of tactics."

"You allow then," I said, "that cases may occur where a street fight is unavoidable. Will your infantry fight in close order, even then?"

"If houses have to be occupied, of course you cannot do that in close order," answered Hallen, quietly; "but it does not follow that every house you hold should be crammed with soldiers. It is enough to occupy the houses which command the streets and gardens; and for such work a few picked men are better than a crowd, whose heads would soon be turned by a bad example. All troops not garrisoning houses, but holding hedges and walls, those in reserve, or those who are to make counter attacks in the streets and gardens, must be in close order. Of course they will, from time to time, detach skirmishers when necessary. Does it follow that because it may once in a way be necessary to place a small portion of in-

fantry by themselves in houses, the entire infantry must therefore necessarily and always fight in dispersed order and in crowds? I have no fear that troops, educated as I wish to see them, will prove inferior to others in street fighting; they will, at all events, strive harder to win and skulk less.

"With respect to woods: they must cease to be 'filters into which entire brigades are poured,' and dropped out in little dribblets on the other side. The unfortunate experience of the last war has caused the fact to be generally recognized that men must be kept together in woods; and if the enemy be met there, he must be charged at all costs. Of what use were the men who were strewn among the thickets of a dense French forest? When the enemy charged along all the roads, paths, and open places, our men fell into his hands without striking a blow. In open woods, with the high and bare trunks so common in our own country, of course the advance must take the form of a firing line, but it should not consist of skirmishers. Even in the most open woods, except in roads and glades, you can seldom see farther than about a hundred yards. The encounters take place therefore at murderously close distances. All depends here in being the first to attack, using magazine volleys and the bayonet. This is the proper place for united action. Therefore do not advance in dispersed order, but in single rank *Züge* in close order, opening files from time to time.

"The attack must often place a particular value on woods, as giving the means of approaching the enemy's position under cover. If woods are not to play the mischievous rôle of filters, we must understand the art of leading, with all due precautions, large bodies of troops in close order through any description of wood, and of deploying them under cover at the further edge without difficulty. Then at the required moment they can move out united, and commence the attack with a closed front. Such skill can only be acquired by much practice. It will be a new force added to the fight in close order."

"And how will you work in mountains?" I asked.

"In mountains my single rank *Züge* will be able to go wherever the modern cloud of skirmishers can. Where, however, only individuals can move, any fight must necessarily be a sort of outpost skirmish, and the education required for this work can only be learnt in the field and on the ranges, not on the drill-ground. Such fighting, being a series of duels, calls for an independence quite different from that of each man in a crowd fighting on his own account. The latter style is hurtful, and to be avoided; the former is a very high form of training, which we should seek to attain."

"Even though not prepared," I interposed, "to give, on the spur of the moment, a fitting reply to all you say; nevertheless, I cannot convince myself that the close order you desire can be maintained under all circumstances. Natural obstacles will play queer tricks with it, and the confusion of the fight will make it more dangerous than the present style of fighting."

"Natural obstacles play the queerest tricks with the modern so-called dispersed fight, by absorbing thousands of troops, and withdrawing them from the fight," answered Hallen, very calmly; "and the confusion of the fight is greatest where there is least cohesion. Certainly, even the best dis-

ciplined troops have moments when they lose both order and cohesion; but the more they have been accustomed to close order fighting, the more harm they will cause the enemy, the less frequent will be such movements, and the greater probability will there be of their speedily regaining order. When men say it is impossible to escape moments of disorder in battle, and that therefore you must give up order and organize disorder beforehand, I am astonished. It is as if a man, afraid of being shot in battle, should at once commit suicide.

"I now come to a phenomenon," continued my friend, "a consequence of the dispersed fight, and one of the chief causes of the frightful mobs which characterized all important infantry engagements in 1870. This phenomenon was the effort of the lieutenant to release himself from company ties, and the similar effort of his captain to release himself from battalion ties, in order to seek opportunities of distinction by individual acts of heroism. The abolition of the dispersed fight is not sufficient to bring order into the combat of greater units without first rooting out this vice. However, as long as officers know that in such deeds lies their best chance of decorations and of honorable mention in official histories, so long will the evil be invincible. Unfortunately there are people who regard this manner of getting out of hand as a particularly praiseworthy quality of our infantry. The fact that such unsound views should be possible proves that the habit of fighting in crowds is rotten to the very core. Perhaps in Homeric days such uncontrolled heroism was in place, but it becomes an evil in the disciplined bodies of the nineteenth century. It is not the heroism of individual groups, but the directed union and order of masses which gains the victory to-day. I am also of opinion that the man who can only be brave on his own account, is not brave enough for a leader. I prefer that courage which executes its allotted task most exactly and punctiliously, indifferent whether such work leads the men under fire, through cover or across the open, against the enemy's front or flank; indifferent as to whether the task promises a brilliant victory or involves certain death for the general good. I prefer such disciplined courage to the valor which, for instance, makes its own way to a point whence, from under cover, it can reach some guns of the enemy, already out of action.

"An officer behaves dishonorably who, without regard either for the common weal or his commanding officer, leads off himself and his men to achieve a personal act of heroism. His motive is a selfish one. Real ambition, the proudest characteristic of a soldier resting on the feelings of honor and duty, has nothing in common with such conduct. I will say nothing about that bolting forward, which consists in marching to the sound of the guns. All 'bolters' should be punished, not rewarded.

"There need be no fear of killing the dash of our officers by forbidding them to leave the path of duty. Every German officer knows that honor forbids him to remain idle where circumstances call for, or permit energetic action."

(To be continued.)

POSSIBLE BATTLE-FIELDS IN THE NEXT EUROPEAN WAR.*

By MAJOR-GENERAL TULLOCH,

ENGLISH ARMY.

ON the continent of Europe so many men are trained as soldiers that the military strength of any nation may almost be said to be every man capable of bearing arms, that is to say, about a tenth part of the population. In France, for instance, at the present moment there are $3\frac{1}{2}$ millions of trained soldiers, of whom nearly $1\frac{1}{2}$ millions could be mobilized in about seven days. Not only are the armies of the Continental nations larger than any ever before heard of, but their training, armaments, and organization as fighting machines have no parallel in military history. Naturally the thought turns to the two countries which will be the principal actors in the European battle-field, viz., France and Germany. Defeat means to either of them destruction as a nation for a generation at least, and in the case of France possibly obliteration. With such momentous issue hanging on the result of the next great European war, it is an interesting strategical study to investigate the conditions under which the armies of the different countries which must take part in the struggle would have to operate. The nations who, like gladiators, are ready to step into the arena are France, Germany, Russia, Austria, and Italy; and without touching upon politics it may safely be assumed that if hostilities commence between any two of them the others would have to take sides at once, and it is generally allowed that France and Russia would act together against the other three. But whatever the alliances may be, the only way of arriving at their military value is by examining the fighting power of each nation separately. Now, the fighting power of a country is made up, so to say, of several different ingredients, the principal one of course being the number of men properly trained as soldiers, and the total population from which others may be produced. The fighting value of the individual men of European nations is not such a variable quantity as might be supposed. There is not a single country amongst the whole of them whose men have not during some period of history been renowned as the best soldiers of that time. Each nation of course shows some special soldier-like quality which is distinctive of that nation, such as the impetuosity of the attack of the French, the coolness of the English, or the stolidity under fire of the Russian; but any or all of them are almost secondary qualifications when compared with systematic training for battle, perfect organization, and capable leaders. The soldiers of the French Republic at the end of the last century, who fled like sheep before the Allies and massacred their own officers in the flight, became in a marvellously short time, when properly trained and led, the conquerors of Europe, and historical research will show innumerable similar

* A lecture delivered before the Military Service Institution of Victoria, Australia. General Tulloch is on a tour of inspection of British forces in Australia.

examples. It is, however, the future and not the past with which we are now concerned, and to forecast what is likely to happen, the military value of the five mentioned nations has to be examined as to—

1. Population.
2. Power of obtaining money.
3. Number of men trained to arms.
4. Actual value of that training.
5. Organization for war.
6. Perfection of arms.
7. Fighting value of men.
8. Means of communication for assembling and feeding.
9. Defenses, natural and artificial.

FRANCE.

To commence with the country whose stake in the next European war is unquestionably the heaviest, viz., France. Her population is about 38,000,000, and the revenue which has to be raised to meet the interest on the national debt and the annual expenditure is £133,000,000. This would seem to be a burden which would cripple any further large war expenditure, but the figure at which the *Rentes* are quoted shows that France is a very long way from being powerless to borrow more. With a productive soil, a fine climate and inhabitants (particularly the peasantry, hard-working and frugal beyond those of any other nation) the wealth of France and its recuperative power after disasters have often astonished the world. The total number of men trained as soldiers amounts to $3\frac{1}{2}$ millions, but of these only half a million are permanently embodied. Now, as regards the value of the French military training, it is not even yet what it might be. Some ten years ago I obtained permission to attend the manœuvres of an army corps in France and go where I liked. I was with the troops from daybreak till dark during the time the manœuvres lasted, and the impression left on my mind was that very few of the men took any real interest in the work. The principal subject which seemed to occupy their minds was the number of months or years they had still to serve. The officers were nothing like so keen as ours always are on such occasions. The drill was good and the attack formations rapidly done, but there was somehow a great absence of reality about everything. Outpost and reconnaissance work was decidedly slackly carried out; in fact, hardly any one seemed to have his heart in the work. I have been told that since 1880 there has been a decided improvement, but since then I have had no opportunity of judging as to the working of French troops in masses. About a year ago, however, I saw on several occasions a particularly fine regiment at ordinary drill, and I noticed that certain points had been copied from the Germans, but it struck me these adaptations were carried out more in the letter than the spirit. The men of one company I saw under instruction at outpost were actually amusing themselves in what is known as skylarking. The discipline seemed decidedly lax, and the two officers of the company were walking up and down in the road quite away from their men. To one who has twice had the honor of serving in a campaign with the French as comrades, deep sympathy with old allies in the misfortunes of 1870 was only natural, and it was sad to look on as a professional and think what might some day again be

the result of such training. Defective discipline has too often been the rock on which French armies have been wrecked. Whilst all is going well in a victorious campaign imperfect discipline is not so much noticed, but when reverses happen, a badly disciplined army soon becomes nothing but an armed mob, which is easily put to flight and eventually destroyed. With regard to organization, the following extracts from Colonel Cooper-King's lecture on "The New Frontier of France" summarizes the matter:

"France adopted after the war the territorial system of Germany, though not in its entirety. German recruits are really localized even to companies, but the French conscripts are not so recruited, but are, possibly for political reasons, drafted to regiments or corps at a distance from their homes; the reserve of the active army and the territorial army are posted to depots in their own neighborhood. Thus, though theoretically the French and German systems are similar, there is an important and serious element of difference between them. As the French conscripts are not localized, but serve in regiments away from the districts in which they live, they would not, as a rule, when called in from the reserve, rejoin the regiment in which they had been previously trained. The bond of union, therefore, that exists between the German reservist and the regiment to which he throughout his entire service belongs is wanting in France. While the German joins a force on mobilization in which he is sure to know his comrades and his officers more or less, the French soldier has all this to learn when his corps is mobilized. This must produce a temporary friction which time alone can alter, and of which, in modern warfare, there is little enough to spare. The army is divided into two groups—the field army and the territorial army—each of which has its reserve, but it does not appear that the latter has any permanent organization in peace higher than the regiment. The field army is organized in corps, each two divisions of two brigades of two regiments of three battalions (the fourth battalion of each being for the fortresses), with the battalion of chasseurs-à-pied, eight divisional and eight corps, and one reserve batteries of artillery, one cavalry brigade of two regiments, and one battery with the usual auxiliary services. It numbers 38,335 officers and men, with 108 guns. "Independent" cavalry divisions of two brigades of two regiments with three batteries of horse artillery are also organized. To absorb her large force of available troops France is divided into eighteen "regions," each of which contains an army corps, and to this must be added the 19th, an Algerian corps, which is also available for use in case of a European war, a local division in Tunis, and an army corps in Annan and Tonquin."

About three years ago the 17th Army Corps was mobilized as an experiment. On the third day the reserves had all joined, and on the eighth the corps was fully mobilized. It was stated by military critics who were present that the mobilization machine did not work so smoothly as on the other side of the Rhine, and that there was some little confusion before the officers and men were established in their respective places and work. It was also observed that the whole energy of the French War Office had been applied to make the mobilization of one corps a success. This may be said to be hypercritical, as the arrangements for mobilization are made in the district of each corps, where the storehouses and magazines have everything ready for instant use. But even if such criticisms had some foundation, the advance made by the French since 1870 has been enormous. At the end of seven days the first line or field army of nearly one million and a half of men and 2000 guns would be assembled, and ready to move into the places assigned for concentration. It is assumed that the whole of the nineteen corps would have reached their positions on the tenth day. As soon as the regiments of the first line moved off from their territorial points of concentration, on the seventh day, the assembling of the second line known as the territorial army, and of about the same strength as the first line, would commence.

With reference to the value of the arms, the French, in both guns and small arms, have always been *facile princeps*.

As regards the individual fighting value of the French, their soldiers, when properly trained and led, have shown what they can do in too many battle-fields to permit of any doubt on the subject. They show to better advantage in the attack than in the defense. The excitable nature of the Frenchman comes out in its best qualities when dashing recklessly forward, but a steady, prolonged resistance on the part of defenders has been often fatal to such impetuous valor, which rapidly exhausts itself. The natural intelligence of the race and fertility of resource have been conspicuous in many campaigns, but when imperfectly trained or when incapably commanded the value of a Frenchman as a soldier does not stand high. Indeed, few soldiers in similar circumstances, can be said to be inferior to him. To a French army defeat is utterly demoralizing, and if the pursuit be well pressed there is an end of the force, but if allowed breathing time no soldiers (that is thoroughly trained soldiers) can pull themselves more rapidly together again, as was proved in the Peninsular War.

With the immense armies now employed, the means of communication by railways, not only for mobilization but even for feeding, have to be very carefully worked out in all military schemes. In a highly civilized country like France all the large towns are connected by railways having an abundance of rolling-stock. With proper organization there should be no difficulty as regards railways. The following from Colonel Cooper-King's paper shows what transport is necessary when mobilizing, and the amount available: "The rolling-stock required per corps is from 102 trains of from 40 to 66 carriages, with a single engine (if light), or 50 to 56 carriages with two engines if heavy (stores or material, as well as men). For one corps 138 engines and 4440 carriages would be required; for 19 corps, 2622 engines and 84,360 carriages. As the Eastern Railway Company of France alone possesses 6000 engines and 200,000 carriages there is no want of carrying power.

The defenses of the country, natural and artificial, have now to be considered. Before 1870 the French eastern frontier was not only naturally strong for defense, but it was also, from its configuration, well placed for offensive operations against Germany. The loss of Alsace-Lorraine has not only deprived France of a million and a half of her best inhabitants, but it has also deprived her of a district which was invaluable from its natural defensive capabilities. When the lost provinces were handed over to Germany, that country then had it in its power to move into France over a comparatively open and easy terrain. There was therefore no other course for the French but to replace the former naturally strong frontier by artificial means. This has been done by intrenched camps, and what are known as *forts d'arrêt*. There are two lines of intrenched camps. In the first are Belfort, Epinal, Toul and Verdun; in the second, Besançon, Langues, Dijon, and Saon; and behind these come Paris with such an extended chain of forts that investment would seem to be practically impossible. Besides these there is an intrenched camp at Lille on the northern flank, and at Lyons on the southern. It may be said that all these works would lock up an immense number of men who would be more usefully employed in the field, but such is not the case. A few men unfit for hard work would be sufficient as simple guards of each fort or battery till the field army required

to make use of them. The intrenched camps also work in with the general scheme of defense as places of assembly for the troops of the second line and rallying points for the field army in cases of reverses. These new works must be looked on more as permanent batteries, ready for the strengthening of positions which would necessarily be occupied by a defending army when an enemy advanced in one of the few directions open to him. The forts and works, some 50 in number, round Paris, of course, make the capital rather more than an intrenched camp. They cost £25,000,000 sterling, and have a total perimeter of upwards of a hundred miles, the object being to prevent a complete investment as in 1870. The total amount expended by the French in defensive works alone is said to be £250,000,000.

The Swiss frontier of France is protected by the Jura Mountains, all the important roads over which are guarded by forts. This frontier would come under consideration only in the event of Germany and Italy deciding to violate the neutrality of Switzerland, and from that country, as a base, directing an allied army against Lyons, for the purpose of preventing the resources of the south of France being used to supply the main army opposite the German frontier.

The line of the Italian Alps is naturally very strong, and where it is at all vulnerable, forts have been built to close the passes. Owing to the peculiar configuration of the Italian Alps, a comparatively small French army could contain and neutralize a much larger Italian one.

GERMANY.

The next nation to be considered is Germany, of which the population is 45,000,000. Germany's ability to obtain money for any purpose would seem to be greater than any other Continental nation, her public debt being apparently under £350,000,000. From the *Statesman's Year Book* the annual expenditure is said to be £70,000,000, but this may not include the 30½ millions referred to in the Budget of the Empire; but be that as it may, it would seem to be sufficient to meet the annual expenditure. In addition to the almost unlimited power to borrow at a moderate rate, a large portion of the indemnity obtained from France is said to be kept in hand in gold ready for any sudden war expenditure.

The number of men trained to arms is about the same as in France, but the actual value of that training is unquestionably greater than that of any other European nation. Although three years is the nominal time for the first period of service in the active army, the infantry usually get off with less than two, but the work the men do during that time is most thorough, and the discipline, training, an iron one. From daylight till dark the work goes on, regardless of weather, the object for which the army is maintained—viz., the day of battle—being constantly kept in view in everything done. The pains taken with each individual soldier has to be seen to be believed, and the systematic way in which every officer and non-commissioned officer carries out the work assigned to him in the task of teaching the men must insure success when the time of trial comes. The officers, particularly in the junior ranks, hardly know what recreation means, but none of the time on duty is wasted. Some people have an idea that a German subaltern

is merely a drill corporal. Nothing could be more incorrect, the German is far too practical to use a razor to cut pencils with. The officers superintend the work of the corporals and sergeants who are drilling the recruits, and do so most thoroughly. To an English officer, the power given to a sergeant with an awkward recruit seems excessive, but no matter how an unfortunate stupid peasant may be bullied, he never shows the slightest sign of irritation. To an ordinary looker-on the discipline and severe training of a German recruit may seem almost cruel, but to those who know what the requirements of war are the final thought is, fortunate the nation with such patriotic citizens, who submit to such severe training for the general safety of their country. The motto "For God and Fatherland" in every barrack-room is in itself sufficient to show what sterling stuff the German is made of. The system of supplying officers for the active army, and also for the reserve, works admirably. Not only are the regimental officers about as good as it is possible to make them, but there are also sufficient thoroughly trained officers on the reserve list ready to fill up all mobilization and war vacancies. No other nation has yet been able to accomplish this most important part of military organization. The German organization for war has been proved to be so perfect that it is hardly necessary to do more than refer to it. The country is divided into 18 districts, each of which furnishes an army corps. The army corps consists of 24 battalions of infantry and 96 guns, that is to say, one battalion and one battery less than the French, but the total numbers are greater. The Germans as regards their second line have a considerable advantage over the French, the organization being completed up to the division, that is half an army corps; the French only go as far as the regiment, that is three battalions.

Judging by what the Germans have previously done, it is probable that the organization of the second line goes a good deal beyond the formation of 18 more divisions. It is more than possible that the 18 divisions are in reality 18 army corps, which would thereby enable the Germans to put 36 army corps in the field almost immediately on hostilities commencing. The German rifles were not as good as the French in the last war, and the French still keep the first position in that respect, and will do so till the Germans have manufactured a sufficient number of small-bore magazine rifles to take the place of the larger bore they now use. The fighting value of the German in these days of long range shooting stands higher than the more impetuous and possibly more recklessly brave Frenchman. The Teutonic temperament is eminently qualified for imbibing that special requirement of the present time, viz., fire discipline. This is ground into him in his training in such a way that it is carried out almost mechanically when in action. This training, combined with an iron discipline and ardent patriotism, places the value of the individual German soldier on a very high pedestal.

The railways, especially strategical lines, have been largely added to since 1870, and there is every reason to believe that the system which twenty years ago worked like well-oiled machinery would do so again, even with double the number of troops to carry.

When the provinces of Alsace and Lorraine became German property, that nation acquired a frontier stronger not only in the natural features of the ground, but also possessing the two first-class fortresses of Metz and Strasburg, which have been improved into immense intrenched camps. The Rhine itself, to say nothing of its fortress-camps, is a powerful line of defense, but it is not with stone-walls, but with men and a perfect system of organization, which will enable it to rapidly mass overpowering forces on decisive points, that Germany proposes to protect the Fatherland.

ITALY.

The next of the five countries for consideration is Italy. This is on account of its geographical position with regard to France. Before the Triple Alliance was arranged the Franco-Italian frontier was almost free from defensive works. Now they absolutely bristle along the mountains, both nations having guarded all the roads and principal passes which cross the frontier.

The population of Italy is about 29,000,000, and her debt is already £450,000,000, with a yearly deficit. The taxes are heavy, and it seems doubtful if more money could be got by increasing them. But with all this burden of taxation the people are very patriotic, and bear it patiently. Even the expenditure for the new ironclads is not questioned, although for such a country as Italy it is immense.

There is some difficulty in arriving at a correct estimate of the number of men thoroughly trained. The war strength of Italy is, however, stated to be as follows: Active army and reserve, 850,000; mobile militia, 400,000; territorial militia, 1,310,000. Of these the estimate of the field army available for active operations varies from 300,000 to 450,000; the remainder of the 850,000 would be required for fortresses, forming depots for second line, and such like. It is calculated that about 200,000 of the mobile militia would be available for forming a field army of the second line.

The Italian army is organized in twelve corps, and the time required for mobilization is stated to be three weeks, as the reservists have to rejoin their original regiments, which, for political reasons, are recruited from different parts of the country. The delay and probable confusion on the railway caused by men from Rome joining regiments, say, in Milan, and others from Venice going, perhaps, to Sicily, would be a most serious matter where time is everything in modern warfare. Except the rather unfortunate campaign of 1866, which was hardly a fair test for a newly-formed nation, there has been no undertaking from which an estimate can be formed of the value of the Italian military organization, but their scheme for mobilization does not stand high in the opinion of military experts. The Abyssinian expedition having been more that of an army of occupation does not give sufficient data for forming any decided opinion. The training of the Italian troops has nothing special to distinguish it from that of other armies, excepting that there appears to be rather a lack of energy. A generation ago the Sardinian army was perfect; smarter men and officers it would have been hard to find; possibly the southern element has now somewhat diluted the northern energy. The fighting value of the

Italian soldier of the present army has yet to be proved, but judging by our old allies, the Sardinians in the Crimea, it will not be found wanting when the time comes; but that the *dolce far niente* Neapolitan can ever stand on an equality with the soldiers from the northern provinces is an impossibility.

The magazine rifle of the Italian army, being a .408 calibre, is now considered to be inferior to the small-bore being made for other nations.

In the basin of the Po and its tributaries there is a perfect network of single-line railways, but the communication as regards the rest of the kingdom, by road as well as by rail, is very deficient. The range of the Apennines has caused the two lines of railway on the east and west coasts to be carried close to the sea throughout the entire length of the country. These two main lines are in places connected by short railways, but the position of the coast lines, on which the movement of troops for the defense of the country must, in a great measure, depend, is a serious matter for Italy, should she be engaged with an enemy having a superior fleet. It may be added that neither rolling-stock nor stations are well suited for the movement of large bodies of troops.

The Alps, which completely encircle Northern Italy, form one of the strongest natural barriers against invasion; and since Italy joined the Triple Alliance every road and valley opening in the direction of France has been closed by strong works. There are mule paths in some places over the Alps at certain seasons, but to make them passable for artillery would be too vast an undertaking for military operations where time is of such value. Peninsular Italy is very open to attacks from a superior maritime power. The protection of the coast towns would absorb a large portion of the army, which therefore could not be made available to meet an invasion from the north. With the exception of Spezzia, there is really no thoroughly protected coast town, and the inland fortresses would be of little use if the French succeeded in breaking through the barrier of the Alps. In such a case, Turin would probably be the first objective. If a French force succeeded in establishing itself on the Turin side of the Alps, and were acting against Italy alone, there would be nothing left for Italy but to make peace as soon as possible.

BELGIUM AND SWITZERLAND.

Before investigating what would probably be the lines of operation in a war between France and Germany with Italy as an ally, it will be necessary to refer to the military strength of other nations whose territory might be made use of by the combatants. These countries are Belgium and Switzerland. Belgium could put two army corps in the field, but unless supported by some other nation, could not operate further south than Malines, which is about twelve miles in front of Antwerp. When the forts around Namur and Liege are finished, the railways in the Valley of the Meuse will be closed to both combatants, and will do more to prevent Belgian neutrality being infringed than many treaties. Other lines, south of the Meuse, can be made use of as lines of communication by either French or Germans, but they would be very inconvenient as compared with those passing through Liege

and Namur. If either side considered it necessary to violate the neutrality of Belgium, it would be more advantageous to Germany to do so than France. A glance at the map showing the boundary lines of the different States, and how hazardous it would be for France to make almost a flank march to strike the lower Rhine, is sufficient to illustrate what is meant. A German force could move through Belgian territory direct on Paris with much less risk.

Switzerland, placed in the very centre of three possible combatants, is in a much more precarious position as regards violation of territory. That country is quite open to either France or Germany, should those nations consider it fit to make use of it. The Italians alone could not force the barrier of the Alps and debouch into the Swiss plains without the assistance of the Germans to clear away the Swiss troops holding the passes, and the French would find it a difficult matter to move into Italy if Switzerland and Italy were forced into an alliance by any hostile action of the French; but to the Germans the Swiss plains are quite open should they consider it advisable to move across the Rhine. There is an idea that France might, if at all successful, try an invasion of Germany by moving through Switzerland and crossing the Rhine at Schaffhausen, but Switzerland has always been very jealous of any attempt to infringe her neutrality, and would in every probability decide to try to stop the trespassers on her soil, and this might be attempted on the line of the Aare. An intrenched camp has been suggested at Zurich, but nothing has yet been done. As regards fortifications by the Swiss, a small amount of fortification, such as that at Airolo to guard the tunnel and one or two other important points is all that has yet been completed; the natural strength of the country and the patriotism of some 150,000 fairly trained militia is considered sufficient to meet all requirements.

POSSIBLE LINES OF OPERATIONS.

The military strength of the countries of Western Europe who might have to take part in the next war having now been reviewed, it will be advisable before turning towards Russia and Austria to try to investigate the probable lines of operations French or German armies might adopt. Before attempting to forecast the future, it will be useful to use as guides the operations of the last great war on the Rhine frontier. When the French decided to commence hostilities, the scheme of their Emperor was to mass 150,000 men at Metz, 100,000 at Strasburg, and with the united armies to cross the Rhine at Maxau, and attempt to break up the confederacy. The German scheme cannot be more lucidly told than in the words of Colonel Cooper-King:

"The plans open to the Germans were of a more simple character. To invade France by way of Belfort was out of the question, for it was too far away, and the long lines of communication would traverse the whole of Southern Germany, and would be parallel to the French frontier. There would be a remote possibility of disturbance by French troops from Strasburg. The ground between the latter place and Mulhausen was very unsuitable for military operations, and the only portion of the frontier available was that bordering on the Rhine provinces of Prussia and the Palatinate. To violate Belgium was unnecessary under the circumstances of her adversary's known weakness in every way. Therefore, Germany massed her forces between Treves and Landau, ready to meet the French directly if they advanced from the northern side of the salient

frontier, or attack them in flank if they ventured to cross the Rhine on its eastern face. If the opportunity arose, they could carry the war into the enemy's territory by the easiest way and the shortest road. Their first and most natural objective was to beat the French armies in the field, their ultimate aim the capture of Paris. So centralized was the political and military organization of the Empire that the possession of the capital, as in 1814 and 1815, would probably terminate the war. Early in August, therefore, Germany had concentrated her three armies—the first under Steinmetz at Treves; the second under Frederick Charles, about Kaiserslautern; the third under the Crown Prince of Prussia, about Landau; the total force amounting to 462,000 infantry, 56,800 cavalry and 1584 guns. The general plan of the German staff was to pivot the army of invasion on the right, and wheeling forward the left wing, or third army, to successively turn the natural obstacles of the Saar to Northern Vosges, and the Moselle, and interposing between the French armies and the bulk of France which lay to the southward, to force them against the northern frontier and separate them from Paris. How the battles of Spicheren, Weissenburg and Woerth, along the Saar and Vosges, and those of Colombey, Mars-la-Tour, and Gravelotte, on the Moselle, resulted in the dispersion or imprisonment of the 'Army of the Rhine' are matters of history."

According to Colonel Cooper-King's investigations, the intention of the French is "to place their first field army as follows: Two corps in Paris, one each in Lyons and Belfort, and fifteen in line, in three armies. Left on the plateau of Boncouville, in front of Commercy; centre on the plateau of Hayes, near Nancy; right on the plateau of Amanvillers, ready to act defensively, or to move forward."

If possible, the object of the Germans would probably be to engage the French at once, and if beaten to drive them back as before against Belgium, and so cutting them off from the rest of France. The French, if beaten, would unquestionably now try to retreat across the Loire towards the south. Paris, it is believed, could easily hold her own till the reinforced French armies from the south were ready to move northward.

If the Germans were not successful at the very commencement of the campaign, then it is more than probable that the French would try a counterstroke from Belfort, but not through Switzerland and across the Rhine at Schaffhausen as is generally supposed. If the French were in a position to attempt an invasion of Germany and the upper Rhine, such would imply that they had a superiority of force sufficient to confine the Germans at Strasburg. If such were the case there is a much more direct road into Germany than *via* Schaffhausen, viz., by the Black Forest. For many years it has been assumed by military writers that the Black Forest is impassable to armies. This might have been so at the beginning of the century, but even that seems doubtful on investigation. In the French account of Moreau's campaign of 1796 immense praise is given to that general for his masterly retreat after the Austrian victory at Wurzburg. Particular stress is laid on his march through the Valley of Hell, a fearful pass, where the rocks almost touched on either hand. On examining the actual ground over which Moreau passed it turns out that his passage of the Valley of Hell was really not more hazardous than an ordinary march in his own country. Two battalions of Austrians who were in the open near the entrance of the entrance of the pass were easily brushed on one side, and the forcing of the pass consisted in marching unopposed seven miles along what was even in those days a very fair road. Had the Austrians in inferior force been on the high plateau on each side of the gorge there was really nothing in the nature of the forest to prevent the French clearing them away from the edge of the ravine. Since those days a network of the most perfect roads

imaginable has been made all over the Black Forest, and it has been proved that guns can be taken up almost any of the rough tracks, even to the top of the Feldsburg, so easy generally are the slopes of many of the hills, except in the ravines. From the valley of the Rhine to the open country on the east is but one day's march. It may be said that the passage of the Rhine anywhere between Strasburg and Bâle, where it is some 200 yards wide, with a swift current would be too serious an undertaking. That river, however, has been crossed there several times by the French, even under fire, and if victorious they would not hesitate to attempt it again. The moral effect of crossing the Rhine would be so great that even if only partially successful, it would be worth almost any sacrifice of men, and it seems strange that the Germans have not prepared a position higher up the Rhine, opposite the Belfort *troué*. Certainly, the works at the little old fortress of New Breisach have been modernized, but something more than that seems necessary. About six miles south of Freiburg, in the Rhine valley, there is an excellent natural position, with the right on the Rhine and the left thrown back towards the Feldsberg. This line being so strong may be considered sufficient, but nevertheless a double *tête*, connecting old and new Breisach seems almost a necessity. But to return to the first position of both armies at the commencement of the next war. The Germans being able to mobilize quicker, would undoubtedly try to repeat their work of 1870, and attack the French before they could get all their forces into line, and so beat them in detail. Should they succeed in this, they must conquer in the end, although they will take much longer about it than they did twenty years ago. Doubtless some of the intrenched camps would prove to be regular Plevnas, and Germany would be almost worn out before France was entirely subdued. If the French are able to get their armies into position in time then one great battle some thirty or forty miles south of Metz (in which numbers such as have never before been heard of will be brought into action) should, practically decide the war.

EASTERN EUROPE.

The military situation of Eastern Europe, with reference to the three nations, viz. : Germany, Russia and Austria, opens an entirely fresh field for consideration. A campaign on the Vistula would necessarily be quite distinct from one on the Rhine, although both, it is assumed, would be carried on at the same time.

RUSSIA.

To commence with Russia, which country may be described generally as a huge plain, drained by sluggish rivers of great size, with marshes and pine woods occupying a large portion of the ground, particularly in the north, its means of communications by road or rail being very deficient, and the people poor and very ignorant.

The total population in European Russia is estimated at 90,000,000, and is said to be increasing at the rate of one million a year. To the above might be added the inhabitants of the Caucasus, numbering 6,000,000. Asiatic Russia is said to contain 10,000,000. The finances of the country

are generally considered to be in an unsatisfactory condition, and, judging by the newspapers, Russia seems to find increasing difficulty every time a new loan is advertised. The country is unquestionably very deeply in debt, but the precise amount is unknown; the interest-bearing portion is about £420,000,000. The Government paper money, the rouble, is now at 80 per cent. discount. This alone will give an idea of the financial condition of an empire which covers about one-seventh of the territorial surface of the globe.

The standing army of Russia numbers about three-quarters of a million, and on mobilization upwards of one and a quarter millions of men could be placed in the first line, with another million in the second. The European Russian active-service army is composed of 17 army corps, each of 32,000 infantry, 4000 cavalry, and 108 guns; in addition to these there are six rifle brigades, having a total of about 25,000 men, besides the force in Finland. It has been calculated that Russia could place, as field armies, upwards of three-quarters of a million of men and 1800 guns on her western frontier in 25 days after the order to mobilize was given. This does not include the two army corps in the Caucasus or the troops in Asiatic Russia. The training of the Russian soldier, who remains four years with the colors, has been much improved since the last Turkish war, but the army is heavily handicapped by the want of education generally of the class which should supply its officers and non-commissioned officers. Accustomed before he joins the army to a life of privation and a severe climate at all times, the rations of other armies would be a luxury to a Russian private soldier. Stolidly brave and uncomplaining under the most adverse circumstances, the Russian, although dull in intellect and deficient in Western energy, makes a good soldier, and when commanded by a man like Skobeloff he can even show enthusiasm for his general similar to that of the Old Guard for Napoleon. Fortunately for Europe, but few Skobeloffs or Suvaroffs have come to the front in Russia, where high social rank, no matter what the professional qualifications may be, seems the first consideration for Russian commanders in great wars. The organization of the civil branches of the army, especially the commissariat, has become a by-word in Europe. Yet, notwithstanding all these drawbacks to military efficiency, the borderline of Russia during the last hundred years has crept steadily forward; its progress has been aptly compared to that of a glacier—slow, but sure, and never going back. Money for warlike purposes may be scarce, but men are plentiful, and losses from defective commissariat and bad sanitary arrangements on active service which would appall a Western nation are thought little of in Russia, provided the object in view be obtained.

The magazine rifle has not yet been adopted by the Russian army. Want of money is probably the reason. Their artillery is very good, and in some respects is said to be ahead of that of other armies, particular attention being given to this branch of the service. A short time ago many regiments of the Russian cavalry were specially trained to act dismounted as infantry, the idea being supposed to be that a large cavalry force should, on the outbreak of war, dash into the enemy's territory, and by destroying his railways and magazines of provisions and stores, paralyze at once his

scheme of mobilization. But this idea does not now seem to be in much favor, possibly because Austria, against whom it has been prepared, has taken precautionary measures by greatly strengthening her cavalry.

Russia being mainly an agricultural country, the inhabitants, speaking generally, live in villages, the total urban population being only a little over 10,000,000. Of these, 2,000,000 live in the three cities of St. Petersburg, Moscow, and Warsaw. With the exception of a few main trunk roads, roads which are understood as such in other parts of Europe hardly exist. The large rivers, of which the bridges are very few, are used in summer for the transport of produce, and in winter sleighs can cross the country anywhere. Railways, single lines, now connect the principal centres of Russian life, but as a rule the railways in Russia have not been constructed for commercial purposes, although, doubtless, foreign subscribers to loans were under that impression. For some time past efforts have been made to complete the strategical railway system for massing troops on the western frontier. These, when completed, will necessitate further expenditure by Germany and Austria for fortifications on similar strategic lines.

No country has better natural defenses than Russia. Large rivers with hardly any bridges, immense marshy districts—that of the Polesia being some thousands of square miles in extent—very few roads, and in the north scanty supplies of food and forage, with miserably poor peasantry scattered over wide expanses of territory, and a severe climate, make Russia a most difficult country to campaign in. The winter begins in November, and breaks up about the end of March; but it is not till May that the country on the Polish frontier is dry enough for campaigning. With such extensive natural defenses the construction of a few artificial ones, at strategical points, is all that is necessary. Close to Prussia there is no special line of defense, but 100 miles further eastward there is the broad expanse of the Vistula, which even at Warsaw is upwards of a quarter of a mile wide. On this river, which lies directly across the path of an invader from the west, strong intrenched camps have been constructed at the three important road-crossings and river-junctions of Novo Georgievsk, Warsaw, and Ivangorod. And 120 miles east of Warsaw, at the most important place on the Bug, viz., Brest Litewsk, where several roads and railways converge, another intrenched camp has been placed astride the river. North of Warsaw the marshes of the Narew and the sterile Masuren district guard against any serious advances from that portion of the Prussian frontier, the works at Goniondz cover Bielostok, and the fortresses of Kovno and Dunaberg protect the railway and road junctions, and to a certain extent would give check to an invasion from the direction of Königsberg. Opposite the Austrian frontier, just south of the Great Polesian Marsh, which is 300 miles in length, is the important road and railway junction of Rovno. To protect this, works have been constructed at Dobno, about midway between Rovno and the Austrian frontier. In rear of this southern portion of the line of defense comes the Dneiper, with the fortified town of Kief, where the main road and also a railway line cross the river, which is here 1000 yards wide.

AUSTRIA.

The last of the five nations to be considered is Austria, of which the population is 40,000,000. This empire is made up of many nationalities, all speaking different languages, and whose patriotism cannot therefore be as steady and strong as that of a kingdom with one language, and acting, so to say, with one mind. The public debt is upwards of £450,000,000, with a chronic annual deficit of four or five millions. Any change for the better seems hopeless as long as Russia maintains such large armies close to her frontier.

It has been computed that Austria can place one and one-quarter millions of men in the first line, and another half-million in the second. As regards the actual value of the training of the Austrian soldier, whose service under the colors is three years, it has become much more practical during the last few years, but even now the shadow of the barrack square seems to deaden its vitality. Routine, red-tape, or whatever other name that apparently immortal enemy to military efficiency is known by, has a congenial soil in Austria. No matter what defeats the monster in question may have brought on the unhappy Austrian army, he is allowed to live, and is even fostered, in the dual empire, notwithstanding that one of the highest military authorities in Austria has spoken out plainly on the subject. A lecture given by Field-Marshal the Archduke John, commanding the 25th infantry division, at the Military Scientific Society of Vienna, in 1883, shows how the Austrians are following the letter and not the spirit of the Prussian system. Amongst other absurdities he mentions that the soldiers are directed to loosen the screws of their rifles in order to make them ring when the men are going through their exercise. The field-marshal speaks out in clear unmistakable language, saying: "We are copying our Prussian masters, being influenced solely by the results they have achieved, and fancying we see the road to success in the caricature of their stiff drill." The lecture at Vienna by such a high authority is an excellent sign, and seems to show at last that the Austrian army may hope before long to shake off that system of stolid military conservatism which, like the old man of the sea, has been an intolerable burden and the cause of defeats which the Austrians have suffered. The Austrians, following the German example, recruit as much as possible territorially; in peace time, there are little more than a quarter of a million of men under arms, organized so as to be expanded by the reserves into 15½ army corps and 28 battalions of infantry, 1 regiment of cavalry, and 88 guns. The second line and landwehr are apparently organized like the rest, on the German model. Unfortunately for Austria, it cannot, apparently, have the same system as the Germans for producing capable commanders and a perfect general staff. In Austria high military command with or without professional ability is still said to be an hereditary privilege, and in the future will probably produce the same results as in the past. There is another special defect in the Austro-Hungarian army, from which others are free, viz.: the multiplicity of languages of the different nations composing the empire and the possible want of enthusiasm in some of the regiments, for what in other countries would be a united national cause. It is said that this line of weakness showed itself in the campaign in Italy in 1859, and also at Königgrätz.

The terrible lesson which Austria learned in 1866, when her infantry fought with muzzle-loaders against the Prussian needle-gun, has never been forgotten, and now their small-bore Manlicher magazine rifle is said to be the best small arm in Europe. Some able military critics even go so far as to say it is better than our own rifle, which has just left the inventor's hands. The Austrians also pay great attention to their artillery, and, like all Continental nations, except the French, they use the Krupp system. As regards the fighting value of the private soldier, it has always stood high, the German race forming a very large percentage of the whole. When beaten the fault has not been with the men. The Hungarians, who number some 15,000,000, make the finest cavalry in Europe, and have shown how duty should be done on many a battle-field. In 1866 nothing could have exceeded the magnificent way in which the Austrian cavalry fought to cover the retreat of the infantry at Königgrätz.

The railways, with the exception of the Trieste, Vienna, and Germany line, are almost entirely single. Efforts are being made to increase the lines over the Carpathians, between Cracow and Lemberg, to facilitate the assembling of the army in that very vulnerable portion of the frontier. But, speaking generally, the railway and road communications of Austria are sufficient for all ordinary requirements. Owing to the Carpathian Mountains encircling the great plain of Hungary, and so dividing it from the rich province of Galicia, the general direction of all the roads and railways of Galicia is east and west, between the Carpathians and the Russian frontier. Four railways cross the Northern Carpathians, connecting the Galician railways with Hungary; but these are hardly yet enough to enable a sufficient force to be assembled in Galicia to meet a Russian advance from Poland. The proximity of the Galician lines to the Russian frontier is unquestionably a great source of weakness as regards the defense of the empire. The idea of massing such numbers of Russian cavalry on the border is supposed to be for the purpose of dashing across the frontier and destroying the Galician railways, and thereby hindering the mobilization of the Austrian arms to such an extent as to prevent the occupation of the pre-arranged positions for the defense of Galicia before the arrival of an overpowering Russian force. The numerous bridges on the Galician railways, which run parallel to the Carpathians, make the stoppage of the railways a comparatively easy matter if the Russian cavalry were well handled. The Eastern Carpathians are a wild and very difficult range of mountains, having very few roads and no railways across them.

No country has so few natural or artificial defenses. The Northern Carpathians, south of the line Cracow-Lemberg, and known as the eastern and western Beskid Mountains, are not very formidable military obstacles. They are crossed by two railways, several good roads, and many inferior ones. This mountain range would, however, unquestionably afford some good positions for resisting a Russian advance if the Austrians had been forced back from their defensive position on the line of the Vistula and the Save, which lies between their only intrenched camps at Cracow, Jaroslavl, and Pizemysl. Were sufficient funds available, doubtless the northern frontier of Austria would be strengthened with suitable fortifications, but

so weak is this line at present that some military authorities are of opinion that it would be the better plan for Austria to improve her mobilization scheme to such an extent as would enable her to move sooner than Russia, and so be able to invade Poland at the commencement of hostilities. The line of the Dneister, from near Pizemsyl to the vicinity of the Roumanian frontier, when looked at from a tactical point of view as a defensive position, is a strong one, but strategically considered, it is of little value. The main attack must be on the northern frontier, and if that were forced then an army on the Dneister would be in a critical position. From an inspection of the map it would seem as if two or three thousand fortress troops might be usefully placed in strong intrenched positions at each of the railway junctions of Stryj, Stanislaus, and Ozerowitz.

POSSIBLE CAMPAIGN ON THE VISTULA.

Previous to attempting any forecast of a campaign on the Vistula, it will be necessary to know the German military strength in men and fortifications on their eastern frontier. Commencing on the north, there are the fortresses of Königsberg and Danzig, which may, from their water communications, be said to form one. Then comes the Vistula, with the fortress and intrenched camp of Thorn, and south of that, at the next rail and road junction, the strongly-fortified position round Posen, on the Warta. Further south there is Glogau and Viesse, and between them the important focus of roads and railways at Breslau, on the Oder. No intrenched camp has yet been formed at Breslau, but apparently one will be necessary as soon as the Russian railway from Lodz is completed to the Russian frontier at Wiernszou. The marshes and lakes on the southern border of East Prussia, and the swampy nature of the country east and south of Posen, add greatly to the defensive strength of the German frontier. There are only three and a half army corps on the eastern line, with headquarters at Königsberg, Posen, Breslau and Bronberg; but the German power of varied mobilization and concentration obviates the necessity for maintaining large forces near the borders. With the Russians it is very different. Owing to their defective communications the greater portion of the Russian army has to be placed on or near its western frontier. Within a radius of 100 miles round Warsaw—and all connected by railways—are no less than three army corps, with two more opposite East Prussia, and two also in close proximity to the Austrian frontier. Behind these, at Moscow, and south of it, are six more army corps, the whole being in railway communication with each other and the force in Poland. Certainly the lines, with a very small exception, are single, and unable to run more than ten trains per day; but even with this drawback it has been calculated that Russia could fill up the regiments from the reserves, and place field armies amounting to three-quarters of a million of men and upwards of 1800 guns on her western frontier in twenty-five to thirty days. If acting against Prussia alone, some 400,000 might be concentrated on the Vistula with about 200,000 on the lower Nieman, and the remainder connecting the two forces at Grodin and Bidostock. Against Austria alone half the total Russian force might be concentrated in Poland and half on the north-eastern boundary of Austria, both ready to move on

the line Cracow-Lemberg. Austria has only two army corps permanently stationed on her frontier, viz., at Cracow and Lemberg, but it is believed she could in 26 days concentrate a total of 12 army corps and 6 cavalry divisions on the line Cracow-Lemberg, giving a total force of about 450,000. The other three corps of the Austrian army could be concentrated in about a week afterwards. Owing to better means of communication and shorter distance the second line could be brought up much quicker than the Russian. Great efforts are being made even now to increase the strength of the Austrian army, and it has been stated on good authority that when the plans are in working order Austria will not be much behind Russia in military strength. In the event of war between Russia and Germany, if the former power took the offensive, a portion of the Russian forces would have to guard against a movement from East Prussia, whilst the main armies from the Vistula marched in the direction of their objective—Berlin. Against Austria alone the main Russian attack would in all probability be from Poland up the line of the Vistula or Save, the remainder possibly working on the line Rovno-Lemberg, to form a junction with the armies from Poland. If the Austrians were beaten the supposition is the line of retreat and invasion would be over the Carpathians into Hungary. Were Germany acting alone, and able to take the initiative, then a direct move on the Vistula is, by professional critics, supposed to be the most probable line of advance. If Austria and Germany were allied, it is supposed the Austrians would move north between the Bug and Vistula, working in conjunction with the Germans in their direct attacks. If the Russians were then driven out of Poland, and a continuation of the war decided on, the next objective would probably be Moscow, the centre of Russian life; there are two lines of operations for such an advance, one being north of the Polesian Marsh, by Smolensko, and the other south of it by Kief.

CHANCES OF PEACE OR WAR.

The military strength of the five great Continental powers having now been stated, it may be worth while to investigate the possible chances of a European war, for which twelve millions of trained soldiers are ready. Germany unquestionably desires peace; the annexed provinces of Alsace and Lorraine are becoming less French and more German every year. Although they may be at times a bitter feeling against Russia, peace with that country has always been one of the first principles of German policy. France, if the chances of success were decidedly in her favor, would unquestionably try to win back the conquered provinces, but none now know better than the responsible French authorities that in a single-handed contest with Germany that nation has all the chances of success on her side, and that if successful, France, as a great nation, would probably disappear from the political map of Europe. Italy is, even in peace time, taxed to almost breaking strain, and unless the the English navy came to her protection must, with her long unprotected coast line and towns, suffer severely if opposed to France. The dream of Italy is to be a great naval power and mistress of the Mediterranean, but whether her finances will permit such a growth

of naval strength is doubtful. On the land side the French Alps shut her in completely; certainly as an ally to Germany, a united army might violate the neutrality of Switzerland, cross the Jura, and strike at Lyons, but to do this would make Switzerland a traditional enemy of Italy. Another and perhaps safer course is, however, open to her, viz., to send an army to help her old enemy, the Austrians, in a contest with Russia. Italy's policy is unquestionably to keep quiet if possible, and reduce her present heavy taxation. Austria would be only too glad to be certain of peace; unfortunately the immense Russian forces so close to her open frontier necessitate her remaining always ready, and continuing her ruinous expenditure. A war which would give Poland to Germany would certainly be an immense relief to Austria. The dream of some Teutons is a union of all the German speaking people in Europe, but that idea is doubtless a long way from realization yet. If it ever does take practical shape, a new federation, extending to the Black Sea, would probably be made; in the meantime Russia is politically hostile to the Austrians, who occupy a strong position on the flank of her advance towards her ultimate object, viz., Constantinople.

There now remains only Russia to be considered. According to the newspapers, discontent, secret societies, and conspiracies against the government are more numerous than ever, and the financial condition of the country certainly does not improve. Under such circumstances, war might possibly be considered a useful expedient to divert public attention from home politics, and also to give congenial employment to the large military element amongst the better classes. Another move direct on Constantinople would bring Austria and the other nations of Europe into the field, and would not be advisable, more especially as the intrigues going on amongst the new kingdoms south of the Pruth do not seem to be entirely favorable to Russia. Warlike operations in Asia, however, would not necessarily affect the Triple Alliance. Russia is steadily sapping forward from the Caucasus, and has certainly marked out Armenia as the next portion of Asia Minor which should be added to the empire. The desert railway has at last been completed to the borders of Afghanistan, and this gives Russia the power of massing troops close to India, thereby preventing England from sending more than two army corps to help Turkey, should that country be attacked in Asia Minor. All things considered, the possibility of war in Europe, where five nations are armed to the teeth, seems very much less than a war in Asia between Russia and England. With the great politicians who are behind the scenes, there are doubtless some insuperable objections to England joining the Triple Alliance, but to ordinary lookers on it would seem that such a proceeding, in which the command of that sea would be worth many army corps, should do much to insure permanent peace to the whole world.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Major W. L. HASKIN, U. S. A.

XIII.

UPON the proposition to open with artillery fire but a short time before the infantry encounter, and then at destructive range. * * * *
I was prepared for your first objection and for the question which necessarily follows.

From the fact that the fire of field artillery has become so murderous, we are tempted to draw the conclusion that the annihilation of an enemy may be accomplished in a very short time, and consequently that, if the infantry attack is to take place immediately afterward, it will be necessary, before opening with the artillery, to wait until the infantry shall have approached the enemy near enough to profit, in making its offensive movement, by the moment when the effect produced by the artillery shall be greatest. Overwhelmed in this fashion the enemy will not have time to escape the shock or to rally and re-establish his lines.

I have heard this idea advanced many times, and a recent pamphlet upon the proper use of field artillery has seriously adopted it. The precise time is laid down and it is stated that to bring to a victorious end this artillery duel, which should begin at a distance of 2200 yards, a quarter of an hour will suffice, and that the same length of time will be required to overwhelm the enemy's infantry. From this the conclusion is drawn that the artillery duel should begin but a half hour before the moment when the lines of skirmishers, in attacking the enemy, will mask their own batteries.

Before discussing this matter in detail, I pray you to take a look backward with me, even to the time of the ancient Romans.

When the triumvirs disputed for the empire of the world, the great battles they fought usually terminated only with the almost entire extermination of one side. A hundred thousand corpses of the vanquished covered the field of battle,—so the historians tell us.

In the following centuries the more deadly the newly invented arms became,—the greater the range of their projectiles,—the less bloody the battles became.

Since balls and bullets have replaced the arrow and the lance, the losses have been still more reduced, and that in a very considerable degree.

Frederick the Great (History of the Seven Years' War) called the battle of Prague, one of the most murderous of the age. He gives the loss of the enemy at 24,000 men (including 3000 prisoners), and his own loss at 18,000 combatants, without including Marshal Schwerin, whom he values at 10,000 men; 61,000 Austrians and 64,000 Prussians took part in the battle. The number of killed and wounded was about thirty per cent. of those engaged. The battle lasted from nine o'clock in the morning until eight o'clock in the evening.

In the battle of Aspern, which lasted two days, 75,000 Austrians (according to Höpfner) fought against more than 80,000 French. (This figure is that of the French effective force, deduction being made for the losses suffered the first day.) According to the Austrian official report the loss of the Imperial Army amounted to nearly 20,000 killed and wounded. Napoleon's bulletin gives as his loss 1100 killed and 3000 wounded, but Höpfner, after having studied all the French official reports, states that, excluding prisoners, the loss amounted to 42,000 combatants. These figures being divided between the two days, the struggle at Aspern is found to have been less bloody than that at Prague.

According to Höpfner the Austrian army at Wagram was 124,000 strong, and the loss amounted to a little less than 24,000. It has been impossible to determine the loss on this day of Napoleon's army, which had a strength of 180,000 men. The bulletin, as for Aspern, speaks of 1100 dead, and from 3000 to 4000 wounded. In any case the battle of Wagram, which also lasted two days, was less bloody than the battle of Aspern.

In citing these two battles I do not know whether I have named the most bloody of the Napoleonic wars, but I think that I have. At Leipzig, at least, the allies only lost during the three days of the battle but 49,000 out of 330,000; that is to say about a sixth of their effective strength, or five or six per cent. for each day.

One of the most bloody combats of this century was the sortie of the garrison of Fridericia, in 1849, which lasted until the Schleswig forces had lost a quarter,—twenty-five per cent. of their combatants. This is one of the last actions fought with only smooth-bore arms. Since that date all armies have been provided with rifled cannon and small-arms.

Of all the battles which have been fought between forces armed on both sides with modern arms the most bloody were, without dispute, that of Vionville, Mars-la-Tour, fought on the 16th of August, 1870, and that of St. Privat, fought on the 18th of the same month, and in the two the Germans lost in killed and wounded a greater per cent. than the French. According to the figures given in our staff history our loss in the first battle was 16,000 men out of 80,000 combatants; and in the second 20,000 men out of 210,000: that is, on the first day a fifth, and on the second a tenth of the combatants. In all the subsequent battles and combats the proportion of loss was much less.

We see, therefore, that the greater the improvements effected in the arms used in warfare,—the greater their range,—the less bloody the battles become.

In saying this I state nothing but what you already know. The fact is so well known, so universally recognized, that more than twenty years ago the inventor of a new fuse claimed, in the preface of the work in which he described his invention, that it was a benefit to humanity because it was an improvement in military fire-arms, and that the more they were improved the less bloody the battles became.

When, in presence of these historic facts, I hear it stated that by reason of recent improvements the effect of artillery shrapnel fire has increased so greatly that in less than 15 minutes one of the armies engaged will necessa-

rily be annihilated, I feel constrained to examine more closely into the reasons why combats have become less bloody as the range of firearms has increased and their fire has become more exact,—more deadly. Perhaps in so doing I shall find some reason which will force us to admit that the recent improvements in our arms may bring about a totally different result.

The chief result brought about by the inventions which enable us to fire at great ranges will be that the fighting will begin at great distances. The long range combat once terminated we pass, if fortunate, to the close combat. But if the result of the long range fighting makes it plainly evident to one of the parties that he will not be successful in the close combat, the great distance which separates the two armies will permit that one to withdraw from the struggle with the greater part of his force or even with his whole force. The greater the distance separating the armies the more easy it will be to withdraw at the proper moment, and this for the fractions of troops engaged in certain special phases of the struggle as well as for the whole force engaged.

At the time when the short Roman sword was the principal arm of the troops, combatants could not be separated when once they became engaged in the *mêlée*. Only the annihilation of one of the parties put an end to the fight.

In 1870 projectiles were thrown to such great distances that Bazaine on the 18th of August could commence his retreat with his whole army without being inquieted, even after St. Privat had been taken by assault, that is, after his position had become untenable. It was only in the village that there was a *mêlée* properly so called, and there the defenders were wholly destroyed,—were all killed or made prisoners.

Possibly you will require that a properly handled artillery should not open fire at distances too considerable, but should endeavor to bring about the decision promptly, at shorter ranges, that is, that it should at once endeavor to engage in the artillery duel, which can be terminated in 15 minutes at 2200 yards with shrapnel; for if the infantry be not allowed to expend ammunition uselessly in firing at long distances, neither can the artillery be permitted to do so.

My personal experience enables me to reply to this as follows:

No one more than I would blame the artillery for opening fire at too long ranges. In my paper of the 18th of March, 1869, which has already been mentioned, I stated that a decisive result could be expected only when the artillery fired at distances less than 2000 paces, but that at distances greater than 2500 paces only a prolonged cannonade would result, while to fire at a range of 4000 or 5000 paces would be a useless expenditure of ammunition. When the war broke out in 1870 I directed the batteries placed under my orders to avoid as much as possible opening fire at a distance greater than 2000 paces. Shortly afterward we received the order from the chief of artillery of the army not to fire at greater ranges than 1800 paces.

I was firmly resolved to carry out these instructions when, on the 18th of August, I reached the battle-field, and my batteries hastened to approach the enemy to the distance at which the artillery fight would be decisive. There was great rivalry among them, at the moment when the

Guard corps began to take part in the action, as to which should first fire upon the batteries which the enemy had pushed forward at first upon the sloping plain before the position of St. Privât. What happened? These advance batteries withdrew into the interior of the position, and the forward movement of my batteries was arrested by strong lines of skirmishers pushed far to the front, of which I have already spoken, which, with their 3000 chassepôts, commanded us imperiously to advance no farther.

Here we were then at the foot of the slope, and the enemy's artillery with which we should first engage was distant 2200, 2800, even 3200 paces. What was to be done? To advance was to come directly upon the enemy. To draw back—to draw back with a line of 54 pieces (the battle began at this point with this number), had been to announce that at this place the battle was lost to us. To remain without firing and allow ourselves to be fired upon by the enemy's infantry and artillery would have been insanity; it would have required of the cannoneers a tenacity and a courage more than human. There was nothing else to do but to open the fight at these distances in spite of my own determination and the order of my superior.

The originator of the order, General von Colomier, came riding through my batteries during the artillery combat, and I made my excuses to him for having opened fire at these great distances, showing him the strong lines of skirmishers we had before us. He approved my action, and warned me against moving forward heedlessly, telling me that almost all of the corps artillery of the IX. Corps had just been very roughly handled at the right of the forest of Cusse, and warning me to avoid such a catastrophe on my part.

The situation was then stronger than our will.

It was only after the action became more general and the infantry took part in it, that we could choose positions at shorter ranges.

Upon the whole front of the battle the artillery became engaged at these same distances. The grand artillery line of the First Army at Gravelotte found itself 2500 and even 3200 paces from the enemy's positions, and General von Dresky tells us in his letter upon the position he occupied on that day that the range at which he fired upon the enemy's batteries was 3300 paces.

It is not absolutely just to compare the artillery with the infantry.

It is true that we require of the infantry that it should not open fire too soon when it takes the offensive, but we require this only when our artillery can open fire upon the enemy against whom it advances. At the present time no one will require of the infantry that it shall march in open field without firing a shot to within 550 yards of an enemy's infantry which is yet intact and which occupies a good position. On the contrary, we reached the conclusion, in my "Letters upon Infantry," that during its advance the artillery should be charged with the duty of protecting it with shrapnel fire, and that if no artillery were available, other infantry troops should protect it by volley firing at a range of about 1100 yards.

The artillery, by means of its fire at long range, can facilitate the advance of the infantry and enable it to approach near to the enemy without

having to open fire, but it is not possible to exchange these duties, for the rifled musket of the infantry will not carry farther than the rifled cannon of the artillery. There exists for the artillery no other arm which has a greater range, and it must itself furnish the long-range fire, under cover of which it will, at the proper moment, approach to the distance at which it can engage in the artillery duel with the greatest chance of success. Besides, the artillery is not affected by the principal reason which obliges the infantry to husband its ammunition during the offensive. It is impossible for the ammunition wagons to follow the infantry during an attack, while, on the contrary, the artillery can replace exhausted ammunition even during the cannonade.

Imagine us engaged in one of the numerous actions in which I have taken part, with this single difference that the distance at which a cannonade formerly led to no result, is now that at which the decisive artillery duel takes place, which should lead in a quarter of an hour to the annihilation of one of the two parties.

I cannot see how it will be possible for the artillery, in the offensive, to delay opening its fire until but half an hour before the moment when infantry is to open its skirmish fire at 550 yards from the enemy, and yet begin the fight at a distance of 2200 yards.

The infantry cannot traverse the distance that it must pass over in order to arrive within 550 yards of the object of its attack without halt, and as it would make an ordinary march. It must advance deployed in skirmish lines—pushed in a wide front against obstacles of every kind—perhaps advance by rushes—and the greatest distance that it can be supposed to traverse in this manner in half an hour will be but the half of that it could make in ordinary marching—say 1650 yards.

At the moment therefore when the artillery should begin the duel at 2200 yards, and a half hour before the skirmish attack that should follow immediately, the infantry should be not more than 2200 yards from the enemy, that is, at about the same distance as the artillery. How can the two arms approach so near to the enemy without opening fire—to the enemy whom we must suppose provided with the same arms, and who could consequently cover them with a hail of shrapnel from the moment when they had approached him within 3800 yards? Would the infantry hold steady under such a fire? Would not its leaders indignantly exclaim, “For what have we artillery if it cannot divert this fire from us? Forward with the artillery and open fire.”

Should the artillery abstain from firing until its own infantry, decimated by the fire of the enemy's batteries, ceases its forward movement, and the attack consequently fails?

Or should the artillery, alone, precede the infantry until it is 2200 yards from the enemy and then begin the struggle?

In the first place this would be acting contrary to the principle under discussion, for it would then open its fire more than an hour before the moment appointed for the skirmish lines to commence the attack with their fire.

Then again it may be questioned whether the artillery, unsupported,

would be able, generally, to post itself at first so near the enemy. It is an exceptional case in which a terrain will be found which will permit of a march under cover until but 2200 yards from the enemy. The defensive position which permits it will have been very poorly selected, and every time that it does occur, and that it is possible to approach the enemy's position so nearly without discovery, the assailant will be tempted to carry it at once by assault. But if some places upon the line of approach can be effectively reached by the enemy's shrapnel fire how can the artillery advance against these pieces which fire without being disturbed, as tranquilly as in target practice? If, besides, there are obstacles in the terrain commanded by the enemy along the front of the advancing artillery line, the immediate movement forward to a distance of 2000 paces will become wholly impossible.

For greater clearness let us return to the situation at the battle of Königgrätz which has served in my preceding letter as a base for my suppositions.

Let us suppose that the defender has posted his artillery upon the heights of Lipa as far as the height "733" west of Langenhof, that is, generally speaking, along the road from Lipa to Stresetitz. He has destroyed the bridges over the Bistritz and we assume that the river rolls with the same considerable volume of water as on the 3d of July, 1866. The shrapnel of the defender carries 3800 yards, consequently as far as Zowetitz, the Sadowa brick-kilns, and Kopanina. The assailant advances from Klenitz and makes a front attack. We may assume also that the wings of the two artillery lines are prolonged by other troops.

How can the assailant's artillery succeed in occupying a first position 2200 yards from the enemy?

It cannot cross the Bistritz, for the bridges have been destroyed and the line of the river is commanded by the enemy's shrapnel fire. The infantry must first take possession of this line. But will the infantry detailed for this operation succeed in crossing the last 500 yards which separate it from the Bistritz, exposed as it will be to the enemy's undisturbed shrapnel fire? If the effect of shrapnel fire be so deadly as the results obtained on the practice ground make them appear, do you believe that it can accomplish this task? I think not. The only course left will be to post the batteries upon the mount of Roskos and near to Mzan so as to open an artillery combat and to engage the enemy's batteries with shell so effectively that he will be compelled to withdraw his attention from the infantry. This will not prevent single batteries from seeking positions under such cover as may be found, as, for instance, behind the brick-kilns, or by the side of the little wood near the sugar refinery, in order to open fire with shrapnel and thus to increase the effect produced by the shell. In view of the great distance separating the two artillery lines it could very easily happen that an hour or more would pass before any result would be obtained. Even a much longer time would elapse if we were not successful in obtaining the range promptly.

I said in a preceding letter that, judging from the tables of accuracy obtained on the practice ground, it was probable that the defender could

reach with his projectiles from Lipa, the highway as far as Dub, with such an effective fire that the infantry marching by this route must cease the advance in column, and that then the situation of this infantry will imperiously require that an artillery line should engage the batteries at Lipa. Hence it will perhaps be necessary that the assailant's artillery should take position at Dub before posting itself upon the mount of Roskos. We must finally acknowledge then that the artillery of the assailant must fire for two hours or two hours and a half before his infantry can think of seizing the Bistriz and re-establishing the bridges.

Here again the force of circumstances will absolutely prevent our putting into execution our firmest intention to await, upon principle, the moment when we can begin the artillery duel at 2200 yards.

The logic of facts brings us to conclusions wholly different from those indicated by the most correct theoretical deduction.

We now come to the strongest argument against the proposition to open with the artillery only at distances less than 2200 yards, and then to engage immediately in the decisive artillery duel which must begin but a half hour before the infantry opens its fire.

Who will guarantee that a decisive result shall be produced in fifteen minutes? Is there a certainty that the artillery will be able to find the proper range at once? Could it not, perhaps during a half hour or more, fail of the mark while believing that it reached it?

In times of peace the artillery has much practice, and follows a very simple system for regulating its fire. It is so easy to observe the effect it produces. When the smoke of the bursting shell covers the target the range is too short, and when the target is seen in front of the smoke the range is too great. The third, fifth, or at farthest the seventh shot must strike the mark. This is what many an artilleryman has said in observing the firing on the practice ground.

But in war the terrain in the first place upsets all the calculations of the battery commander. If before the target there is a hollow of no great width which is not apparent from the battery, and in which the bursting shells are not immediately seen, the escaping smoke dissipates in rising and shows the target so clearly that the observer believes it to be behind the target, and that his range has been too great. When one of these depressions is found 500 yards in front of the target the battery commander could be mistaken by at least 500 or 600 yards in the distances between the shot which went over, and the one which fell short, and consequently throw away all his ammunition in pure loss. I have witnessed a practice firing in peace time in which one of the most experienced professors of the school of firing continued firing in this manner at a range 500 paces too short. In action I have seen a considerable line of artillery, beside which I was posted, fire for a long period at too short a range, until finally I discovered it and caused the error to be corrected. The enemy upon which it was firing had established his batteries upon the farther edge of a plateau; in the middle of the plateau was a hollow, and the artillery, misled by the deceitful appearance of the smoke, believed that the enemy was posted upon the edge of the plateau nearest it.

There are other means of observing the effect of the shots. The captain stations himself upon a flank of his battery, with his field-glasses in hand, and with such cover from the wind as he can find. Supposing his station to be on the left wing he will know that all shells bursting on the right of the object fired at must have fallen short, and those bursting on the left must have passed over. That is simple and easy. But it happens even in peace times that a gunner aims upon the wrong target (the enemy being represented by a line of pieces) and when this happens the captain will necessarily be deceived in the result, and will arrive at conclusions wholly false.

But in action the observer has to struggle with yet many other obstacles.

It may happen that the smoke of one of the enemy's cannon hides the smoke of his own shell, and consequently he does not see the explosion at all. If the enemy be fired upon from several directions he will perhaps mistake a shell from another battery for one of his own, and will draw a wrong conclusion, and will fire many shots upon wrong data. After a time the mistake will be found out and then he will begin again from the beginning. But during this time the fire of the enemy will have become more intense and he will have obtained the range of our guns. Our observer endeavors to observe a shot, but the smoke of one of the enemy's bursting shells passes before his glasses and veils the sight,—perhaps dims the glass. He cleans it with his glove and orders another shell. At this moment his horse becomes wild with fright because of a shell bursting near him, and he considers himself happy not to have been thrown, though the shell was lost. Then another shell falls in the midst of a team and bursts, and the horses take the bits in their teeth and throw themselves upon him just as he is endeavoring to observe the effect of the next shot. The enemy's shells fall more and more thickly in the battery. His men show themselves a little agitated. They aim with less accuracy, and consequently his observations are no longer of any value.

These things happened to me personally at Sedan where I had posted the first two batteries of the corps artillery. They were behind a hedge, and some trees which I hoped would hide our position from the enemy. But our first shell burst in the branches, just in front of the pieces, and therefore it was necessary to cut the trees down, and that consumed a quarter of an hour. Then all the incidents enumerated above took place, and, taking it altogether, the enemy made it very uncomfortable for us. The only possible course left to take was to cause the firing to cease along the whole line; to give directions anew for the pointing; and then to fire salvos from each of the batteries so that the simultaneous explosions of the six shells would furnish reliable data upon which to regulate the firing. This crude fashion of obtaining the range proved to be very effective, but he who had proposed it, Colonel von Scherbening, was just at that instant even, killed by a shell. We commenced to make good practice, the enemy no longer fired with coolness, his fire ceased to do so much execution, and very soon we held the upper hand. More than an hour had passed before we had been able to attain this end.

The distance was, if I am not mistaken, as much as 3100 paces, or 2600 yards (the artillery counted by the geometric pace of 29.5 inches, and not by that of 31.5 inches, which the regulations now prescribe for the infantry). We were then very nearly at the range considered as most favorable for the deadly artillery duel which it is now thought will lead to a decisive result in a quarter of an hour.

After our artillery line had silenced our opponents I rode to another battery to see whether it was making good practice, and, being in that state of mind which leads one to interfere prematurely, called out to the battery commander: "Captain, you have too great an elevation." The Captain smiled and replied that his pieces were still not sufficiently elevated. I showed him then the smoke of a bursting shell far beyond the enemy. "That was not one of my shells," was his reply, made in a very positive tone. I then gave him a positive order to fire at 500 paces less range. He did so and I saw he was right. I left him the control of the firing and in a little while he found the correct range. What struck me particularly was that he did not look toward the object aimed at, but only at his battery, he being upon its flank. I asked him why he proceeded in this manner, and he replied: "The one-year volunteer Klopsch follows the flight of each shell. He passes from one piece to the other as they are about to fire, places himself where he is sheltered from the wind, and after each shot makes me a sign that I understand." You see there are various methods of obtaining the range. If each battery had a man gifted with sight as piercing as that of Klopsch, obtaining the range would be an easy matter.

No receipt—no precise rule—exists which can always be depended upon. There is but one thing to recommend, and that is to acquire the facility by actual practice, and the rules given at the school of firing furnish only a useful foundation.

It was a very poor consolation for me to find that my batteries and I were not the only ones to commit such errors in regulating their fire during the war.

I have just said how I myself saw a neighboring line of artillery fire for a long time at too short a range, and General von Dresky writes what follows upon the action of August 18, 1870:

"It has happened to me to meet with an interesting experience which proves that it is possible to be deceived in the observation of the target, in spite of field glasses. This is what happened: It seemed to us that the four French batteries upon which we first opened fire on the 18th of August, which had taken position before Montigny-la-Grange, were behind embrasures cut in a garden wall. We saw but the flash of the discharge and these without doubt came from loop-holes, and at these we aimed. Two days later we visited this point and ascertained that the batteries had actually been stationed in advance of the wall, for it was there that we found dead artillerymen and horses, and splinters of wood; while we found that no loop-holes had been cut in the wall, and that what we had taken for embrasures was only the effect produced by branches of trees hanging over the wall. The distance from this place to the position we occupied on the 18th was about 3200 paces (consequently at least 2600

yards). The terrain had been ploughed in all directions by our shells, and if we did actually cause considerably loss to the enemy's batteries it was because they were placed too near the wall, and because our projectiles scattered more or less, to say nothing of the fact that we had expended a very considerable amount of ammunition (about 1200 shells)."

I could tell you of other high officers of artillery, well trained at the school of firing, who have told me of similar experiences, but I have not asked permission of them to publish their names, and, furthermore, I believe that what I have already told you will suffice.

You will find it wholly natural that it is not so easy to regulate the firing at a range of 2200 or 2700 yards if you consider that 2200 yards makes a little more than a quarter of a (German) mile, and that 2700 yards makes a third of a mile.

Place yourself upon an eminence, and fix upon a point distant a quarter or a third of a (German) mile. Imagine to yourself a village there behind an undulation of the ground or behind a hedge where you see the flashes from the cannon, the shells from which reach you, and that these flashes are all that you see of the enemy; that you begin to fire your trial shots, and that, while observing them, you are constantly disturbed by his shells. You cannot be astonished if, under such conditions, you commit errors, or have to observe for a quarter of an hour, or even during an entire hour, before obtaining the range. In any case, you must agree that it is impossible to count with certainty upon being the conqueror in the artillery duel in the space of fifteen minutes from the moment the first shot is fired.

But what will you do if the artillery duel at 2200 yards or 2700 yards does not bring about the hoped for result? Or, further, if it constitutes a check to your artillery?

The general commanding will act upon the assurance that you have given him in regard to the issue of the conflict. He will calculate that the artillery duel will take a quarter of an hour, and that you will then employ a quarter of an hour in cannonading the enemy's infantry. If the general conforms to the ideas now current, he will say to the Chief of Artillery: "You have half an hour in which to perform your part, at the end of that time I will be with my skirmishers so near the enemy as to mask your fire." At the very moment when the Chief of Artillery opens fire at 2200 or 2700 yards, the infantry, which has until then been held at the same distance from the enemy, where, under cover, of course, it takes the attack formation, commences its advance. At the end of half an hour it finds itself 500 yards from the enemy's infantry.

But what if the artillery be deceived in its anticipations; if it has not yet succeeded in bringing an effective fire upon the enemy? The infantry then, if it has succeeded in advancing so far under such circumstances, finds itself, at the moment when it masks the fire of its own artillery, in the face of the enemy's intact position and loses heavily, not only by the fire of the enemy's infantry, which is far from being overwhelmed, but by that of a part at least of the enemy's artillery. The catastrophe is yet more inevitable if the assailant's batteries have been silenced in the artillery duel instead of being victorious.

In this fashion the artillery, if deceived in its calculations, will not only have exposed its infantry to decimation, but will itself be in danger of destruction; and this result will have been brought about by its postponing too long the moment for opening fire—by its determination to open the artillery duel at distances not greater than 2200 or 2700 yards—and by its belief in its ability to bring about a favorable result in half an hour.

In view of this danger, the general commanding will not give his approval to such a risky combination; above all, if he has once proved, at his own expense, how dangerous its execution is. He will order his artillery to occupy that of the enemy, so as to turn its fire from his infantry, and, this duty being accomplished, to prelude to the infantry attack at the moment when he wishes it to be executed.

Hence it follows that in future we will proceed as at present with the artillery combats except that the ranges will be greater.

At first there will be a cannonade, and I understand by that the comparatively ineffective fire we are obliged to open to draw upon our artillery the attention and the projectiles of the enemy's artillery, or to prevent it from embarrassing the advance of our infantry. I have heretofore explained that in view of the present range of the pieces, circumstances may require that we begin this cannonade at a distance of 5500 yards or more.

Then the general commanding will fix upon the point at which he will execute the first attack. As soon as he shall have settled upon his plan of operations the artillery will advance to the extreme limit of shrapnel range (about 3800 yards), and, opening an artillery combat with shell, will endeavor to silence the enemy.

When the general finds that his artillery is overcoming that of his adversary, he will be able to fix upon the instant when he will cause the attack to be made.

Then only will the artillery be able to engage in the decisive duel with its fire. It will advance by *échelons*, profiting by any cover the ground may offer, and continuing its fire.

If the result of this duel be to silence the defender's artillery, then the moment will have come for the general to move forward his infantry, which, formed in the order for attack, has been awaiting the order to advance. It can then reach the enemy but a half-hour after the artillery duel has ended.

While the infantry is advancing this distance of 1700 to 2200 yards, the artillery will cover the enemy's infantry with a hail of shrapnel, always following up its infantry by *échelons*, as I have said to you in my "Letters upon Infantry."

The increased range of our pieces, therefore, makes it a necessity that we should not delay, longer than in the past, the moment for opening artillery fire, but that, on the contrary, we shall be constrained to begin the fire sooner even than we do now.

Whether we wish it or not, this cannonade will last a longer time. That is to be expected; for the farther an arm carries, the greater the distance at which we will open fire with it.

I maintain nevertheless, what I heretofore said, that it is not permissi-

ble to begin a useless cannonade at too great ranges, while if the enemy commits the foolishness of thus throwing away ammunition we may rejoice at it without imitating him. But if the adversary in acting thus actually reaches us, then we must reply and fire also.

Through the improvements in the construction of our pieces ranges will still increase, and the distances at which we now only waste ammunition in firing, will in future be those at which the decisive result will be obtained.

This is why the artillery combat will necessarily begin hereafter at distances at which heretofore there could be no question of it.

On the other hand, the improvements in the arms used in warfare will cause battles to become less bloody. For if one side be overpowered in the artillery combat outside of effective shrapnel range, its leader will be able, three times out of four, to evade the decisive struggle, by reason of the fact that he is still 3800 yards distant from his adversary.

SOME RUSSIAN IDEAS ON FORTIFICATION.*

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IN the present day the science of fortification, like that of naval tactics, is in a problematical condition. There has been a superfluity of theory without the requisite modicum of practice; and in both cases the contest which is in progress between artillery and armor plates seems to have introduced the prevailing element of doubt. On the sea this cannot be set at rest till a collision has taken place between two great maritime powers; and on land the next great war, whether in the East or West of Europe, will instruct us as to the value of armor-clad forts. These, as is well known, have been constructed in great numbers, by France on her eastern frontier, and by Belgium to close the valley of the Meuse to an invader. In Roumania, again, they are in course of erection along the banks of the Sereth, also around Bucharest; while quite recently a writer in a German periodical has recommended a line of cupola forts stretching from the Baltic to the Austrian frontier, in order to cover the necessarily slow concentration of the Russian armies. General Brialmont, the distinguished Belgian engineer, is the premier champion of armor-clad mechanical defenses, by means of which he hopes to reduce the strength of standing armies both in the field and in garrison. His opponents among continental writers are numerous; they remark that the General, from a too exclusive contemplation of his own branch of the service, has forgotten that it is subsidiary to the rest, and point to the undoubted fact that a nation must principally rely for security on the numbers and courage of its living defenders. For what Power will first begin to reduce its armies and put its trust in passive defense? Only the weakest, while the strong will take advantage of the adversary's folly. The idea includes the same funda-

* *Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens.* May, 1890. *The Engineer Journal.* St. Petersburg, January, 1890.

mental defects as other projects for general disarmament which have preceded it.

Among those who assume a position diametrically opposed to Brialmont is Lieutenant-Colonel Velitchko, of the Imperial Russian Engineers. Starting from the assumption that a concentrated fire of artillery *en masse* is even more decisive in sieges than in the open field, he maintains that this must be obtained by increased mobility, not by burying guns in casemates or cupolas. Cupolas, he admits, may certainly in the course of time be perfected to the extent that they will be made proof against bombs and other implements of destruction; but it will be at the cost of their efficiency; the cupola at this stage will have become a "dark, damp vault, enveloped in masonry and iron, and loaded with complicated machinery; it will have lost its uses and degenerated into a huge and costly plaything." It will be impossible, he judges, for armor to keep pace with the growing powers of artillery, and some other means must be devised to oppose it. These means, to anticipate his conclusions, he professes to find in the living defenses of the country; in other words, in suitable infantry positions taken up in the intervals between the detached forts, which will, supported by a concentration of mobile artillery, thus play a subordinate instead of a leading part in the general scheme of defense.

Among other things, Colonel Velitchko advocates the substitution, wherever possible, of concrete (*beton*) for armor-plating. Concrete has only $\frac{1}{15}$ the resisting power of iron, but then its expense is only $\frac{1}{200}$ of the latter. Ten metres of concrete cost no more than 5 c.m. of iron, while 3 m. afford bomb-proof shelter, and it takes 20 c.m. of the metal to secure this advantage. This material must also, he insists, be used instead of wood for gun-platforms. The biggest melinite bombs used in the experiments at Bourges merely worked a funnel of 30 c.m. depth and 1.20 m. diameter in this material. This funnel may be easily repaired with sand and cement, or it may be temporarily covered with an iron plate.

The casemate can only be used for flanking purposes in the counterscarp of ditches, where it remains protected from the besieger's fire. The writer, however, does not approve of Brialmont's proposal for flanking batteries, which consist of a concrete wall of 3 m., covered by an iron roof of 24 c.m., which is supported by iron pillars. The embrasures are too long to permit of the ditch being thoroughly searched; they may easily be obstructed by broken fragments of concrete; the whole structure would be injured and shaken by every bomb which falls on the iron roof; the edges of the latter are not sufficiently strong, etc.

The massed fire of artillery can never be replaced by that of a smaller number of guns, though these be the better protected. Montalembert recognized this truth, but placed his artillery in casemates because its locomotive powers were in those days extremely small. The various European Powers followed the letter but not the spirit of his doctrines, and vast casemates were in consequence reared. Carnot endeavored to restore to the defense its forfeited superiority, not by augmenting passive resistance, but by a more rational distribution of the works, frequent sallies, and the free employment of the vertical fire of mortars. Todleben perceived the futil-

ity of the gigantic casemated barracks of Sebastopol, and at once surrounded them with earthworks. He it was also who first adapted their trace carefully to the locality, armed the covered way with artillery, and connected the intervals between forts by trenches, thus availing himself of mobility and concentration of artillery fire. The rage for cupola turrets has arisen and subsided in the twenty years which have elapsed since the Franco-German War; already the French are in despair about their forts on the eastern border, and the writer thus casts their horoscope: abandonment, demolition, or reconstruction. It is stated that their aim becomes so wild when they have been subjected for some time to fire, that the percentage of hits on shots fired sinks from 60 or 70 to 6.

In recent years turrets have certainly become dearer, though scarcely better. The author holds that the acknowledged incapacity of armored turrets to resist direct fire has led to their being hidden from sight beneath earth or concrete: for example, Schumann's disappearing turret for quick-firing guns, and Bussière's sinking turret, which are both worked by hydraulic power. But even Brialmont has rejected all mechanisms worked by steam or hydraulic action as too complicated and expensive; though on Sorriot, or Souriau's turret he has bestowed an unqualified approval in these words: "at last a type has been discovered which, requiring nothing but manual labor for working it, hardly differs in cost from ordinary turrets." The Russian colonel describes this fabric as "an armor-clad ship on dry land." It floats in a reservoir of water, and thus can be elevated or depressed at will by four men using as many levers; it is in brief, a "colossal buoy," to have recourse once more to nautical terms. Velitchko, however, is not satisfied with its properties; elevation and depression is effected too slowly; it requires a gross depth of 12 m.; the water in the tank will soon become foul, and the slightest leak will empty it; the axis of the system is too unstable for a correct aim to be taken after firing; and the shock of a hit on the iron structure, being communicated to the water, will tend to burst the sides of the vessel. In 1888 a Belgian captain, Van Choberek, received a prize from the Jury of the Brussels Exhibition for certain improvements in the above system, which afford greater stability to it.

Mougin's "oscillating tower" ends the category which is exposed to Colonel Velitchko's destructive criticism. This, too, belongs to the "disappearing" class, and its duck beneath the surface of the ground is effected by the whole fabric oscillating on a horizontal axis passing through the centre. In the loading position, the muzzle is below the surface, and it is lifted into the firing position by means of a windlass. After the discharge, the reaction of springs sends the platform back into its former position. The defects of this system are that the carriage, being one with the turret, will not resist without injury the impact of bombs which strike the iron roof, and the same may be predicted with regard to the horizontal axis on which the whole system works.

Finally, the writer arrives at the conclusion that no turret has yet been invented which corresponds to the requirements of the case, and—a somewhat sweeping assertion—that one never will be. The modern reliance on

passive defenses has given birth to plentiful vagaries. Mougin would garrison his forts with mechanics only; Schumann requires not a single rifleman for his; Sauer proposes a fortress to consist of a triple girdle of iron turrets, each containing twenty gunners and mechanics. In Germany there are engineers who dream of movable fortresses to be transported by rail from the eastern frontier to the West, according to requirements. In France, however, the mania for iron forts is cooling down. Systems of defense must be accommodated to the indestructible truth that the science of artillery is constantly progressive.

A Russian officer advocates, in the *Engineer Journal*, the extensive use of fougasses in the defense of forts. The tendency will show itself in the future to attack these works by open storm without awaiting the formal proceedings of a siege. The crowning of the glacis being no longer a condition precedent to the final assault, the assailant cannot be forced to engage in subterranean warfare, and therefore the forming of countermines may be safely left till he has declared the intention to do so, and only on fronts threatened by his approaches. On the other hand, they should all be armed with fougasses, laid during the period of mobilization, in order to co-operate with the rifle fire and artillery in repelling a sudden attempt or *coup de main*. These would be bored beneath the glacis at a depth to which no shell could penetrate and fired by electricity from within the fort. It is recommended that two rows of fougasses be laid, because, if the first explosion fails to create a panic among the stormers, a second always succeeds in effecting this object. The engineers should place small sticks or tufts of earth not noticeable to others immediately above the mines, that the look-out sapper on the rampart may signal the exact moment for his comrade who controls the galvanic wires to fire.

Another writer in the same journal, on "Hasty and Leisurely Field Fortification," emphasizes the fact that, in modern campaigns, frequent combats or "chance encounters" are sure to take place between the advancing columns of hostile armies prior to the decisive battle which settles the fortunes of the war. In such cases, he lays down that "hasty" fortifications are applicable, as one or two hours, or perhaps only a few minutes, may be available for the purpose. But the trenches thus thrown up should be susceptible of enlargement and adapted to the requirements of "leisurely" executed field-works, which the general action may bring into use.

THE GERMAN CAVALRY IN 1889.

(From the *Revue Militaire de l'Etranger*.)

Translated by Bvt. Major-General S. W. CRAWFORD, U. S. ARMY.

THE campaign of 1866 in Bohemia, originated a progressive movement which has brought the German cavalry to its present status. The regulations of May 5, 1855, then in use, and which continued in force until 1873, were greatly complicated, and their application to varied ground difficult. The principles laid down for the handling of masses of cavalry were rudimentary. Add to this, that in Prussia, after the campaign of Schleswig-Holstein, and the war of 1859 in Italy, as elsewhere, the opinions expressed upon the diminished usefulness of the cavalry had evoked a certain echo, and it is not surprising to see this arm to a great extent unused in the Bohemian campaign.

A German military writer characterizes the rôle of the cavalry in 1866, as follows: "Marching with difficulty in the rear of the army, suffering in consequence from an insufficiency of forage, this mass of 14,400 horses rendered relatively but little service. In no case was it upon the ground at the point when its action would have been of the greatest benefit, so that at the close of this short campaign, the cavalry attached to the infantry divisions were almost completely exhausted. This fraction of the cavalry had been made to perform all the duties of protecting the army, of reconnaissance, and of action upon the field of battle. It is evident that the cavalry attached to the divisions of infantry alone were called into play necessarily in a restricted sphere. The ultimate success attained could not warrant such an employment of mounted troops. All of the military writers beyond the Rhine were prompt to recognize the fact that, as a whole, the rôle of the Prussian cavalry in 1866 had greatly diminished, if compared with that which it played in the last century. Its relative superiority in face of an adversary who risked nothing would not modify this view of the case.

Prussia did not fail to profit by the experience acquired in the Bohemian campaign. One definite conclusion might safely be drawn from the latter events, and it was this: That if the adoption of arms of long range had modified the rôle of the cavalry, the principles upon which its action depended had not changed. It became necessary then, and at once, and at the very beginning of a campaign to restore the cavalry to its place in front of the army. All felt that now, that it was freed from the infantry columns which had paralyzed it, it was called upon to discharge, on a far larger scale, the duties which the cavalry attached to the divisions of infantry had formerly undertaken, and to which it had been unequal.

"Since 1866," says a German military writer, "when the Prussian cavalry was handled with such incompetence, everything has been changed in that arm. This has been the work of the arm itself. The true principles of its being have been gradually restored. We find in fact this remarkable result, that only now, after a series of experiments, numerous tentative

efforts, and a fierce dispute, they have taken up the thread where the First Napoleon dropped it."

The writer adds "The war of 1866 taught the following lessons :

(1) It showed the difference between the employment of the cavalry of the *corps d'armée* and the independent cavalry.

(2) It proved that the best unit for the independent cavalry is that of the division.

(3) It established the fact that the independent division should on principle be placed directly under the orders of the commander-in-chief of the army." From this the formation of grand units of cavalry would follow, and in consequence the necessity of training in the management of these units. But during the short time which intervened between the campaign in Bohemia and the events of 1870 Prussia had only time to decide upon the new way in which she proposed to launch her cavalry. Her regulations did not undergo any modification. The manner of employment had changed, but the mechanism remained.

In Germany the majority of military writers considered the war of 1870-71 as furnishing conclusive evidence of the beginning of a new era in the history of the cavalry.* It was a conclusion somewhat exaggerated, and no doubt drawn from the fact that the Germans were successful. They had returned purely and simply to the methods in use at the beginning of the century—those which were in force in the armies of the First Empire. Yet it must not be forgotten from the peculiar circumstances of the case that the test was incomplete, the German cavalry having been able, without interference, to develop at ease its system of reconnoitring.

The divisions of cavalry had not only regained their independence and sought in advance of the army the active participation which had devolved upon them; but were employed in reconnoitring at great distance from the brigades of the corps which had alone performed this service in the Bohemian campaign.

The war of 1870-71 only served to confirm the Germans in the opinion, that since 1815 the principles which should have served as the basis for the employment of cavalry had been called in question, and that this arm of the service in imagining that its proper rôle might be annihilated by the improvements in firearms, was wholly in error.

General Carl von Schmidt was among the first to oppose this fatal impression and to demonstrate that the cavalry was capable of the same improvement as the other arms of service.

"If we cannot improve our arm, like the infantry, by technical inventions," said he, "let us turn our attention to moral and intellectual reforms. The object to be attained may be briefly stated, as address, mobility, military fitness, rapidity, independence and speed."

The studies of Gen. v. Schmidt helped to break the old mould in which the cavalry had been, as he termed it, "crystallized." In his instructions he indicates the course to pursue. The reform of the existing regulation affects the first line. Rapidity of movement demands simplicity in the

* *Militär Wochenblatt*, June, 1876.

method, and mobility is the reward. The cavalry having become entirely independent of the other arms, should sustain itself, and to accomplish alone all the duty or service required of it. Hence the necessity of providing it with the long range arm. In short, the rapidity of movement as well as the necessity of speedily crossing open spaces of danger, compels the reduction of the weight of the saddle and equipment, to be borne by the horse, to the strictest minimum.

According to Gen. v. Schmidt, these were the principles which the cavalry could not disregard in attaining the highest degree of efficiency in the field.

It soon became necessary to alter the regulation for the military evolution, but it was with wise deliberation and great prudence that the Germans decided to interfere with the tactics of their cavalry. A provisional regulation of January 9, 1873, abolished all useless field movements, altered others, and inaugurated a new departure in the management of large units of cavalry and their tactical uses in war. It was the first step taken in regulating the use of masses, and it was left to time to familiarize those interested with the new principles. At this period the military literature of Germany abounded in criticisms upon the principal operations of the cavalry in the late war, and these criticisms bore mainly upon the weakness of the effective forces engaged.

Provisional as it might be, the improved regulation of 1873 became definite in 1876.

That which defines the regulation 1876 is the recognition of the normal constitution of the division and the adoption of a normal order of battle.

The division of three brigades is considered as the established type, and, if the regulations are silent upon the constitution of these brigades, they nevertheless permit it to be assumed that the division will comprise one brigade of heavy cavalry and two of light cavalry or dragoons.

The German military writer we have already quoted, thus expresses himself upon the constitution of the independent cavalry divisions.*

"In the organization of cavalry, all other considerations must give way to the demands of strategy. In view of this the Second and Fourth Divisions in the last war were the best organized (they comprised the brigades without fire arms, and those armed with carbines). But, as the principle of the unification of the cavalry which involved the instruction, armament and organization of that arm, was not utilized in the German army, the composition of the independent divisions competent to meet the strategic exigencies would remain an unsolved problem. As far as the cavalry was concerned one essential quality was demanded; it must be available for strategical as well as tactical uses, as an independent body, or as a *corps de combat*, and thus regarded, there was no difference between the cavalry divisions and the cavalry of a *corps d'armée*, and hence it was essential that all of the cavalry should be equally instructed and prepared for all the demands made upon it, whether for the charge, for long raids, or for fighting on foot.

The German general officers in the war of 1870 and 1871 had become

*Ueber die Bewaffnung, Ausbildung, Organization, etc.

convinced that cavalry when provided with firearms was freer, more independent, and the result of that conviction was the organization of the cavalry divisions as is hereafter described. It should be remembered that at this period more consideration was given to strategical than to tactical dispositions. "Our arm," said Gen. v. Schmidt, in his reflections upon the employment of the independent cavalry division "is to be employed in future wars as it was in the last campaign; because of the opinions indorsed by the army chiefs; opinions, that afterward were transformed into principles; and for the reason, too, that our generals and the entire army have derived the greatest advantages from this mode of employment of the cavalry, and because, too, it is precisely this rôle which is most suitable to our arm, which renders it more useful and doubles its moral value. We have then to fulfill the same mission in the future as in the past," and the General adds, "to make strategic reconnaissances and to protect the troops which it covers. These are the two obligations which devolve upon the cavalry division."

With a programme so clearly defined, it remains only for the German cavalry to settle its organization and to establish tactical rules which will insure the success of its strategical operations.

Since the cavalry was called to operate in front of the army, which was its essential rôle, it was obliged above all other considerations to engage the enemy's cavalry upon this special ground.

After having restored the tactics of the line, the regulations of the 5th of July, 1876, prescribed what should constitute a normal formation for battle sufficiently flexible to allow of a rapid deployment in all directions, and to insure at the same time uninterrupted action as well as concentration.

The division operating far in advance of the army in its search for the enemy, was supposed to be completely scattered. Upon this point General von Schmidt thus expresses himself in reference to the distribution of the component parts of a division of cavalry on the strategic front of an army:

"Two brigades march in the advanced line; each of them place one regiment in the first line; these two brigades cover a front of from 30 to 44 kilometres; each regiment occupies a space of 15 to 22 kilometres. Each one of these regiments disposes in the first line of two or three squadrons and keeps the remainder formed in close order in the second line in rear of the centre of the first. The squadrons in the first line form a special advance-guard and remain constantly connected with each other. Each regiment in the same way is in connection with its neighbors. In each of the two brigades of the first line the second regiment follows the first; it is usually placed in rear of the first regiment at a distance of about 3500 metres. Behind this line at a distance of 7500 metres is stationed the second brigade which forms the reserve."

In case of an engagement a division so disposed upon an extended front has from necessity to concentrate with rapidity and to face the enemy in an order unusual to it.

The brigades, forming the several lines, were indicated rather by circumstances than by the formal order of the commanding general, and

hence the regulations of 1876 laid down the principle that a division of cavalry in "order of battle" should form in three lines of equal strength.

As to the engagement itself, the attack of the division was to be made "in order of lines." The first line giving the first shock to the enemy, the second line covering the first and supporting its movement by a flank attack, the third line forming the reserve.

In view of the cavalry tactics, as determined by the regulations of 1876, Major von der Goltz thus writes in *La Nation Armée* :

"The formation in three lines was believed to be the true one : one for the shock, a second for the support, and a third for the reserve. A single regiment is too weak to produce a vigorous shock ; three regiments are too difficult to handle. The formation of the lines with brigades of two regiments into four squadrons is no longer used.

"It is essential that all of the lines should be of the same strength, as it cannot be anticipated which one will be used for the attack, which for the manœuvre or the support, or which of them will be held in reserve to strike the decisive blow, or to remedy a temporary check.

"The tactics of the three lines actually adopted in the German cavalry have this essential advantage, that the role assigned to the second or third line may without hesitation be equally assigned to any one of the three." As a consequence of the convictions resulting from the experience of the war of 1870-71, and in reference to which General v. Schmidt had become the most earnest advocate, the cavalry had adopted a normal order of battle for the division ; the brigade in some manner constituting the great tactical unit of this formation. As to the course to be followed in battle, it may be thus tersely expressed : "Attack upon the front combined with an attack upon the flank."

Since this period, however, these views have undergone a singular modification in Germany, which seems to have adopted an entirely different plan. The tactical employment of the cavalry arm appears to have absorbed to its profit the almost exclusive interest which was formerly taken in the strategic operations. That, in thus modifying its views, Germany had not lost its interest in its cavalry, is abundantly proved in the regulations for field service published in 1887. It would appear as if the desire was to give to the cavalry a larger sphere of action in battle, while it was evident that its strategic action would end very speedily in an engagement.

"The more the military forces of Europe are systematically organized," says an author already quoted, "the more the means of defense will be varied and numerous ; the more the cavalry, above all if it has in its front a cavalry equally well instructed, will be hindered from observation. Prompt and extended movements will be undertaken with difficulty, and its action, which is supposed to be purely strategical, will change immediately into tactical action, or battle, in which it will disengage itself equally on foot or mounted."

Subsequently, in speaking of "battle," the same author, after an extended commentary upon the operations of the cavalry on the fields of Königgrätz, of Custoza and of Vionville, renews the criticism so often made upon holding the cavalry systematically in reserve for the close of the

action. He holds that if actively employed in the battle they can be dispensed with for the pursuit, and he maintains that the result of their employment in battle exceeds in importance that of the pursuit, and he attributes to the non-employment of cavalry until after the action, "the great want of success upon almost every modern field of battle." Major v. der Goltz, in discussing the pursuit and prompt use of victory, had always remarked that the "immediate pursuit" was scarcely ever resorted to in the late wars, and he added, "The character of the modern battle is opposed to its employment."

Many other military writers in Germany have revived the line of thought which after the Bohemian campaign, and also after the events of 1870-71 had led the cavalry to consider its rôle upon the field of battle as nearly ended. Since 1883, Major v. der Goltz whose opinion we have cited upon the subject of the pursuit, wrote in the "*The Nation in Arms*:"

"The cavalry aspires again to play a decisive rôle in battle, as formerly, when Seydlitz attacked at Kolin, at Rosbach and at Zorndorf. The hope which it cherishes arose from certain crises in the great infantry combats during the late wars. Often the lines of skirmishers were seen to give way under fire, to become thinner, to scatter, to spread out and break in their effort to turn the enemy. The forces, exhausted in proportion as they advanced through the grain-fields, having manœuvred and made long marches in close columns to cross the fields; their ammunition exhausted, many officers fallen, were no longer under command. It was then that many who witnessed this scene inquired anxiously what would be the result if now a large body of cavalry should appear upon our flank and pass like a storm over the field? It would sweep away without difficulty every vestige of the infantry."

At the battle of Vionville when it began to grow dark, and when scarcely any infantry was visible over the vast plain, but a great mass of artillery only, of more than 100 pieces, without protection, the same thought suggested itself. It was considered impossible to check a body of cavalry which should throw itself resolutely upon these batteries. This was one of those opportunities when all of the cavalry yet disposable should be thrown upon the enemy."

Without assuming to decide the question, Major v. der Goltz concludes in these terms:

"It is possible to obtain these results with masses of cavalry in battle, but experience has yet to show whether they can be maintained in sufficient numbers to be considered as a new factor, changing the present mode of fighting."

To Prince zu Hohenlohe* the experience appears to be conclusive: he says, in speaking of the charges made by the brigades Pulz and Berjanowics upon the division Bixio and Prince Humbert at Custozza: "This cavalry charged upon the body of skirmishers, broke through some squares and spread a panic to the most distant lines. The attack was made after seven o'clock in the morning. At eleven, and at four o'clock the two

* "*Lettres sur le cavalerie*."

Italian divisions under the demoralization to which these charges had early subjected them, remained still in advance at Villafranca, immovable as if under the influence of a spell."

Upon the whole, the current of opinion which gives to the German cavalry an important tactical rôle in future wars increases more and more. This is plainly marked by the modifications which the publication of the regulations of the 10th of April, 1886, have caused in the regulations of 1876. All traces of exaggerated formalism have disappeared from the regulations now in force in the German cavalry: the division *type* of six regiments and the normal formation for battle have been abolished, and the composition of large bodies of cavalry is left to be determined by circumstances.

During the late war, the divisions were as we know of very variable strength. One division (the 5th) numbered nine regiments, while another (the 3d) had but four. A like inequality between units filling the same rôle appeared to be unjustifiable, and led the Germans to adopt the division of six regiments. This standard coformed logically to the tactics of the lines such as they were then laid down in the regulations of 1876. To-day the division of three brigades of two regiments is to be considered as an expedient only, and not as a normal type. The composition of large units of cavalry will, in the future, depend, without doubt, upon the immediate duty which is assigned to them; as well as the exigencies of the service, which place in the hands of the same commander the different units scattered upon the same front of operations, and finally the ability of the officers assigned to command them.

The regulations of 1886 in considering the formation in three lines, or rather in three *échelons*, as the one to be generally adopted, lay down, as the first principle in the fight of cavalry against cavalry, the absolute necessity of making such dispositions as will assure, before all else, the victory of the first line. "The first line," says the regulation, "forming the head, inflicts the principal stroke upon the enemy; it is necessary then to make this line as strong as possible so that its strength should insure success. It is essential to confront the enemy with a first line stronger than his own. In most cases, it is necessary to place in the first line, the half at least, of the disposable squadrons that are left."

The cavalry is thus looked upon as a true arm of surprise marching to the conquest of its adversary both materially and morally; at the first onset it should insure the preponderance in the attack, for it is essential before all other considerations that the enemy should have no time to rally.

The German tactics have long assigned the duty of insuring success to the third line or the reserve. The part borne by the reserve in the cavalry engagements is different from that in the engagements of infantry—if the victory should in the latter case belong to the force which in the last resort disposes of a unit of infantry in close order, the Germans consider that, in the engagements of cavalry, success will belong to that side who resolve from the opening of the action, and without hesitation, to sacrifice the greater part of its force in a vigorous attack. In order to increase this necessity, the regulation assigns to the second line a rôle which almost merges it in the first. "The second line should by its action arrest any

retrograde movement of the first line; it should march directly behind it with one portion of its squadrons at grand intervals, while with the principal portion it will flank either one or both of the wings. The flanking fractions form the protection of the flanks of the first line."

The first line, freed from all anxiety for its flanks, has then but one object: to destroy by a violent onset the disposition of its adversary.

The third line, reduced in numbers to the strictest necessity (the 16th of the forces of the division), is designed to confirm the success of the action.

The regulation examines, without considering it as an exceptional attack, the charge against infantry. More earnestly than in the fight against cavalry, it urges simplicity as to the mode of action. "In a well-formed infantry, the front and the flank are equally strong against cavalry, consequently, in choosing the point of attack where the ground does not decide, it is oftener the better course to take the shortest route."

It is in the formation of several lines by which cavalry will attack infantry, and it is by repeated strokes that it will break its resistance. In view of this the regulation considers that the first line may be broken by the different attacks it makes, but it is the mission of the lines which follow to strike successively the points which have resisted the first shock. In regard to an attack upon artillery. The regulations admit purely and simply a direct attack against the front: the cavalry forms itself in two lines, the first in one rank. It is this line which will serve as the object of the artillery fire.

The second line, formed of compact squadrons, will follow directly with large intervals. It is this which will be the true line of attack.

The results of the employment of the cavalry in Germany have been greatly simplified, as it appears since the late war, and particularly since 1876, the date of the publication of the preceding regulations. The regulations of 1886 maintained that success was more to be anticipated by a strong direct attack upon the enemy's front than upon evolutions, always complicated and slow of execution, which would lead to a flank attack. It is doubtless for this reason that the regulations lay it down as a principle that the cavalry should always charge "*sur un grand front et d'une manière enveloppante.*"

The present tactics of the German cavalry are no other than those of the great Frederic. The regulation of 1876 was already imbued with the spirit of those tactics, and the regulation of 1886 had almost adopted its forms. Without desiring to impose upon its cavalry the rôle which devolved upon it in the battles of the Seven Years' War, it is fair to conclude that Germany, in future battles, will assign to it a more important rôle than the one it performed in the late war.

We have described the general sentiment in accordance with which the regulations had been modified—our Eastern neighbors do not appear to rely upon them. The tactics of the infantry and artillery have been simplified and revived. To-day the regulations of the 10th of April, 1886, upon the cavalry drill, although relatively recent, become the oldest in date, and it is to be presumed that they will be shortly submitted to other modifications.

It is generally admitted that there is yet something to be done in simplifying these tactics (the half column, for example, scarcely ever employed in the manœuvres, is destined to disappear); that certain tactical requirements have not been sufficiently generalized; it is necessary to leave more independence to the commander, in short, it is indispensable to destroy the last vestiges of formalism which may yet remain.

In regard to its armament the German cavalry is in a state of uncertainty. The lance, which it is contemplated to generalize, is on trial in many of the regiments. Whether it is destined to become the arm of all the cavalry is not yet determined.* Meantime this arm is greatly praised on the other side of the Rhine: the place upon the field of battle to which it is desired to restore the cavalry is one of the strongest reasons that is used to secure the general use of the lance.

In an article upon the armament of the cavalry recently published in the *Militär-Wochenblatt* of the 20th of July 1889, we find this sentence which marks pointedly the tendencies which we have above noted. "The cavalry ought to be convinced that it has the best possible armament, so as to deploy upon the field of battle the maximum of material and moral force, and to find itself in a position to go even to the support of the infantry. It is to attain this double object that Germany increases the number of her lancers, and that she has given the carbine to all her cavalry. The German cavalry is convinced that the lance is the true arm for the field of battle."

If those in favor of the lance are numerous on the other side of the Rhine, all of the military writers are not meanwhile agreed as to the special type of the arm that should be adopted, and still less as to the way in which this arm should be distributed to the different units of cavalry. It may readily be imagined that the decision anticipated will have a great influence upon the modifications yet to be adopted in the modes of combat.

However this may be, a very strong tendency to unification in the German cavalry may be remarked, and it will not be long before its armament is definitely decided upon. The remodelling of the regulations will be the necessary consequence of this action.

In any case it may be concluded from these successive evolutions in the opinions formed, from the modification in the estimate of the rôle of the cavalry in battle, that it is the evident intention of the Germans to make in future wars the largest possible use of this arm, as well tactically as strategically.

* Adopted since.

Military Notes.

ARTILLERY PRACTICE CAMP AT OKEHAMPTON.

THE artillery practice camp at Okehampton now occupies so conspicuous a place among the military institutions of the country that a review of the work done there from year to year seems necessary in the interests both of the artillery and of the army at large. Have the lessons taught by the experience of last year received practical application during the progress of the present shooting season, and have any fresh questions been raised for determination either in regard to the tactical employment of artillery in action or to technical matters of purely artillery concern? First, then, as regards the experience of last year, recent reports from Okehampton show that the lessons taught have been carefully learnt and are now being systematically applied. Batteries reach the practice-ground ready to begin to shoot the day after arrival. Preliminary drill is learnt beforehand. It has not been possible to watch the conduct of different batteries at Okehampton this year without feeling that the utmost pains have been taken by their commanders to train their men in fire discipline before reaching the camp. It is now exceedingly rare to find officers interfering in details which ought not to concern them when all ranks have been instructed beforehand in their duties. The functions of commander, second in command, subaltern officers, sergeants, layers, and other working members, are now clearly defined beyond possibility of confusion. From the word "action" to the words "cease fire" each individual in the battery has a distinct duty, or rather succession of duties, to perform; and according to the degree of perfection which is reached by each during the preliminary instruction, so will the united results of the whole battery be correspondingly successful when tested by actual shooting. A battery of artillery now works like a machine—a self-acting, living machine, set in motion by its commander, and kept moving by the regularly directed action of each unit maintained in due gradation through all ranks. Drill, however, is only a means to an end. Has the shooting improved? We quote from the private letter of an artillery correspondent: "The results this year are most encouraging. Firing at 3150 yards at a small infantry target of fifteen dummies, in five minutes every man was hit more than once. This and similar shooting go to show that we can force infantry to deploy and hide their faces at least 1000 yards before we come under their effective fire. With the 12-pr. gun, if the layers are quick and accurate in using Colonel Scott's sight, there is no difficulty in finding the range in five or six, or even in fewer trial shots. We found shrapnel with percussion fuse most effective. When in action against some guns the camp commandant

suddenly ordered us to fire at a cavalry target on our left flank, and gave us five minutes to do what we could. We picked up the range (2700 yards) and put fifteen shell into the target in the time allowed, disabling every man in the group. Probably half-a-dozen shell would have sufficed to beat off the attack. It is easier to shoot at moving targets than when they are stationary, because the target is more easily visible, and the fuses can be rapidly shortened as the enemy advances. The difficulty at Okehampton is to see the targets, as the dummies are purposely concealed as far as possible in order to make the practice more real. This difficulty would disappear in a real battle. The 12-pr. shrapnel shell is a most terrible man-killing projectile, and it is impossible to exaggerate the effect which well-directed artillery fire must have in the next war." Infantry officers who have visited the camp this year corroborate the above opinion, and agree that the effective power of modern guns has increased *pari passu* with that of rifles. As regards the future, the question of range-finding and the supply of ammunition are the two points uppermost in the minds of artillery officers. With regard to the former a correspondent says:

"There is some disappointment at the range-finding school at Aldershot because battery commanders do not use their range-finders, or value their services, as much as might be wished after the trouble taken to instruct them. The real fact is, the gun fitted with Colonel Scott's sight is so accurate and rapid a range-taker that in nine cases out of ten a battery commander prefers to trust to his guns rather than to the report of his range-taking non-commissioned officers. The average time taken this year at Okehampton by the range-takers exceeds five minutes, half of which time should be enough for any battery to range itself by trial shots. A great deal of power is employed on range-taking. Each battery has to give up one officer, at least two of its best non-commissioned officers, and three horses, for a purpose which artillery officers apparently do not set much practical value on. Questions of this kind settle themselves. The only *raison d'être* of range-finders is to assist the battery commander. If he finds he can range his battery quicker with his guns than with his range-takers the question must at once arise whether the power diverted from the shooting strength of the battery to range-taking is not wasted, and whether the practical results are commensurate with the great expenditure of time, labor, and money spent on this object. German artillerists will have nothing to say to range-takers. I am not satisfied that they are not right, and that we in England are not wrong." Before expressing a definite opinion on such a matter, it would be better to await the report of the camp commandant at Okehampton, who has had special opportunities this year of observing the range-takers at work, and who will, we are confident, be able to form a sound judgment as to their practical utility in the field. No useful purpose is served by hasty criticism. As regards the service of ammunition, the opinion seems to be gaining ground that, whenever possible, ammunition should be supplied direct from the wagon bodies, the limbers both of guns and wagons being moved away to a safe place directly the battery comes into action. The gun-limbers should be kept as a last reserve, with full boxes and fresh horses, ready for an ad-

vance to the next position. If this system be finally approved, wagons must always be accustomed to be brought into action simultaneously with the guns. Gun and wagon should never be separated. This is a new departure, and one which must have an important bearing on future artillery tactics. The advantage of bringing up the wagons and unlimbering them in rear of the guns is that in the space of a few seconds every horse is taken away from the fire which the guns are certain to draw when once in action. The alternative method of serving ammunition from the gun-limbers and unhooking the horses meets with general condemnation from artillery officers. Certainly, in our view, unhooking horses under modern fire does not sound practical. On this point we shall again await the camp commandant's report with interest and expectation. With reference to tactics, it is now more than ever settled that the battery is the unit for fire and manœuvre. Six guns with their wagons are as much as one man can bring into action and control with his own hand and voice. For purposes of organization, batteries are collected by threes into brigade divisions; but it cannot be too clearly understood that the purpose of the brigade division is for organization only, and not for drill and manœuvre. The colonel of artillery who in the next war tries to play the part of a cavalry brigadier, and heroically lead his three batteries into action, will lead them to certain destruction. The conditions of cavalry and artillery fighting are absolutely different. For artillery fire effect so much depends upon the local circumstances of the ground selected that each battery commander must reconnoitre his own ground and personally bring up his own battery on to the actual position where he is going to fight his guns. Such drill movements as are now practised at Woolwich and Aldershot—long advances of many batteries in line and deployments from deep columns—are unreal, unpractical, and misleading. For our part, we should wish to see what is known as precise drill limited to the battery, and any attempt to combine batteries together for drill movements forbidden. As soon as the fire discipline of a battery is perfect, and as soon as it can drill steadily under its own commanding officer, drill should cease and instruction in manœuvre begin. While battery officers have derived much benefit from their experiences at Okehampton, the superior officers of artillery do not seem as yet to have grasped the functions which the next war will require them to perform. Those functions will be to keep in constant touch with the general officer commanding the force, to ascertain his plans and changes of plan, and instruct battery commanders accordingly. These instructions should be limited to indicating the general positions to be taken up, the target to be fired at, and when a change of target or position is desirable. To perform this rôle properly requires close and keen observation of the progress of the fight, which it is impossible for an artillery colonel to follow if he is incessantly interfering with the executive conduct of battery commanders and concerning himself with petty details of no real significance. Here we must leave this question, but not without congratulating artillery officers upon the tremendous strides recently made both in shooting and fire discipline. With a gun of unrivalled power, with a thoroughly serviceable equipment, and a highly trained personnel, they may

now look forward without anxiety to taking their share, if required to do so, in the next European war. It only remains to express the hope that those officers and men who have been instructed during the past three years at Okehampton may continue to serve with that branch of the artillery in which they have now been trained, and that the folly—for it is nothing else—of transferring them on promotion to a totally different sphere of work may no longer be perpetrated. After all, the last word will always depend on organization, and until the organization of the Royal Artillery is remodelled on intelligent principles it is hopeless to look for continuous improvement either in shooting or in that tactical training which is essential to secure the full effect of modern artillery fire.

ENGLISH CAVALRY MANŒUVRES.

In the *Times* of Tuesday appeared a most practical and common-sense letter from a French cavalry officer on our Cavalry Manœuvres. The writer came over, he tells us, to learn something, imagining that a horse-loving people like the English would have their cavalry in the highest state of efficiency. Having reached Aldershot, the first thing that struck him was the absurdity of our selecting an infantry general to direct the operations of a cavalry force. "Not in France, in Germany, or in Austria," he says, "would such a command be intrusted to a general belonging to another arm." And he goes on to inquire: "Can it be possible that in your nation of horsemen you have no general capable of manœuvring and instructing two brigades?" But, as the letter we published last week from a military correspondent clearly showed, there are others besides this gallant "Sabreur" who are astonished that the English cavalry should have been subjected to such an unmerited slight. Having given vent to his feelings on the subject of command, our foreign critic goes on to discuss some of the details of our system. Here we had best, perhaps, let him speak for himself:

"Now, I saw upon the parade many fine horsemen and horses; but their organization is a thing that puzzles me, and upon which I can get no explanation. I see one splendid regiment of Horse Guards, mounted upon magnificent black horses, in three squadrons of 150 horses. It is the only regiment on a Continental scale in the field. But, side by side in this same brigade, I see two regiments of Hussars, one of which has not more than 200 horses; and the soldiers appear very young, almost boys. I ask: What is your organization of cavalry? What is the strength of the units of regiments and squadrons? No one can tell me. I see one regiment of 600 horses, in three squadrons of 150; alongside, another regiment of 200 horses, in three squadrons of 70. The Horse Guards' regiment is not a permanent regiment as now constituted. It is composed of officers, men, and horses of three regiments; and to form this one fine regiment an officer tells me that 'the cream has been skimmed off the whole Household Brigade of Cavalry.' But yet you are a practical and economical nation as administrators, and you dislocate a whole brigade and take three regiments with its cadres of officers and staff (*petit état-major*) to form one regiment. In France, as in Germany, there is an effective strength of 700 horses in

each regiment, of which 600 go to the field in four squadrons, the fifth squadron remaining in barracks as a depot to supply casualties. In the 2d Brigade at Aldershot all the regiments were weak in numbers, and none were of equal strength. There was one splendid corps of Lancers, as far as appearance went, which I took for a strong squadron, but a colonel told me it was the whole regiment. I say to him, 'Half the regiment is left at home?' He replies, 'On the contrary, every available horse is on parade, including horses of four years old, some of which have been less than six months in the regiment.' I was told it was the same in the Dragoon and Hussar regiments! Horses of four years old! In Germany no horse under seven takes part in manœuvres; and in France, by the recent law which will add 7200 horses to the establishment, no horses are to be counted on the effective strength till five years old, and will not go to manœuvres until six. I ask: Is it good economy to work these young horses? Will they have force to stand the fatigue? Will they not always bear trace of it? Or is it that we on the Continent are mistaken and that horses of four and five years old are mature, with their bones hard, and their muscles and tendons well set and developed in strength? I do not think that we are mistaken."

"Sabreur," having delivered himself in the above very forcible terms on the question of organization, proceeds to deal with other matters of interest. He evidently does not "fancy" Colonel Hutton's ideas in regard to mounted infantry. "He expected," he says, "to see infantry soldiers on little horses or hill ponies;" his surprise was great when he found the men mounted on trained cavalry chargers. To sum up his impressions of this new arm, "they carried long rifles, did not wear boots, and rode indifferently;" and he expresses a doubt as to the probability of either France or Germany following our lead. But one of the most important points touched upon by this evidently qualified critic is our arrangement for mobilization. Our peace system may be a most faulty one. This would not matter much if things were so ordered that for the purposes of war we could bring together a force which would be able to compete on fair terms with any troops with which it might be called upon to cross swords. Are matters so ordered? What has "Sabreur" to say? We will again quote his own words:

"Seeing so many regiments with small effective, I ask how on mobilization the necessary men and horses would be obtained. The answer is a doubtful one. A few hundred men who in bygone years have served in the cavalry are on the strength of the Reserve and may be available. As to horses the omnibus and cab horses of London are under contract to be handed over. A thousand thunders! The famous British cavalry to consist of men who have lost the habit to ride, and mounted on the broken-down horses employed in trades! Perhaps, in this case, the mounted infantry is more suitable. At all events I prefer our Continental system with regiments maintained in peace at war strength, and with an effective of horses not under five years old. It is not considered that a Reservist who has left his regiment more than a year is fit for cavalry; and in case of mobilization he serves in the train."

It is well that we should sometimes see ourselves as others see us. It was only last week that one of the highest military authorities in the country was telling the good Cutlers of Sheffield how much progress we had made of late years in the direction of army reform. The British army, according to this distinguished officer, was never in such a splendid condition as it is to-day. Lord Wolseley has had a great deal to do in creating the present system, and he may be excused for thinking better of it than others do. The letter of "Sabreur" will serve a useful purpose if it only induces those in authority to recognize the fact, unpleasant as it may be, that the system which we have built up is not perfect, and that we never can make it so as long as we pursue our present policy of underrating the value of regimental opinion. What "Sabreur" has been telling the British taxpayer through the columns of the *Times*, British cavalry officers have been saying among themselves for the last twenty years. But they have been given no voice in the direction of affairs. The lamentable condition of unreadiness to which our cavalry has been brought is one of the results of our false administration. There is not one word in all that this foreign critic says which can be objected to. It is outspoken, honest, and valuable criticism, and it is entirely in accord with military as opposed to official opinion.—*Army and Navy Gazette*.

RUSSIAN IDEAS ON FORTIFICATIONS.

This interesting topic is continued in the June number of the *Mittheilungen über Gegenstände des Artillerie und Geni-Wesens*. The necessity, in modern siege operations, of combining the practice of masking artillery with the utmost degree of mobility is dwelt upon. High-angle fire has been carried to such a pitch of perfection that it is no longer indispensable to get a view of the object aimed at. Hence the necessity of masking guns by means of a parapet about three yards in height; indeed, a second one is sometimes added, or a screen of brushwood, trees, etc. If the enemy can be led into error as to the assailant's position, so exact is modern fire that he will drop his projectiles one after the other quite harmlessly on to that limited area which it represents, and, especially since the introduction of smokeless powder, it will not be possible for him to correct his aim by observing the discharges of the hostile artillery. Formerly this was not the case, for the very imperfections of artillery caused projectiles to spread laterally to such an extent as to preclude the hope of securing by masking. Finally, no doubt, the enemy will find out the true position; but then the principle of mobility must be invoked; the defenders will shift their batteries to another locality, which they will retain till once more discovered. Thus the armor-clad siege batteries proposed by General Brialmont will not be called into requisition. Todleben first conceived that the defender's line of fire might be developed by the use of batteries intermediate between the girdle of detached forts, protection being assured by a covered way and glacis uniting the whole circle. The heavy ordnance he would have located in the batteries, the forts being garrisoned by infantry. But his recommendations were not accepted; the heavy guns remained in the forts, which were plated with armor, this kind of protec-

tion constantly growing more expensive and complicated. Various historical examples of the advantages of masking guns are cited. At Belfort, a cavalier 21 m. high, presented a huge mark for the fire of the attacking party. A masked 24-pounder mounted on it contended against the enemy's artillery during the whole of the siege, and only ceased fire when it had become unserviceable from the number of shots discharged. Of these it had fired 5000, having received 60,000 in return from the besiegers, who were unable to ascertain its exact position. At Plevna, we learn, the Turks usually removed their guns from the redoubts during a bombardment, placing them in a masked position outside. The interior of a fort is compared to a gigantic "shell trap," an admirable target for the besieger's batteries and especially for his mortars. Batteries for the direct attack should therefore be stationed in the intervals between the forts, those, however, for flanking purposes in casemates within them; the former to be masked and enabled to change position when the enemy's fire becomes too hot for them to stay. Colonel Velitchko, the author of these reflections, is of opinion that detached forts should be looked upon as "pivots" for the protection of the heavy ordnance in their intervals; the forts to be connected by means of a glacis and covered way, behind which a *chaussée* or railway runs for the transfer of guns to the right or left. The glacis should be masked by plantations of trees, which should not strictly follow its outline, the batteries to be dug in the glacis or constructed 100 or 150 paces behind it. Small permanent batteries, containing at least four guns a-piece, to replace those which formerly conducted the direct attack from the forts, should be built at favorable spots, and should be provided with casemates and magazines. Disappearing gun-carriages should be used. The article is a long one: the above are the chief points urged on our attention.—*The Illustrated Naval and Military Magazine*.

ARMY PROMOTION IN ENGLAND.

A French paper claims for the French army that it has "the youngest colonel of all the armies of Europe in the person of Colonel Paul de Benorst, of the 17th Chasseurs, who succeeds to the command of his regiment at 43 years of age." Our French contemporary evidently is not posted in the details of the English army, or it would know that there are several officers in command of British regiments who are under 44 years of age. In the cavalry at the present time we have Colonels Douglas-Willan, 1st Dragoon Guards; Lister-Kay, 2d Dragoon Guards; Amyatt-Burney, 3d Dragoon Guards; Grant, 7th Dragoon Guards; Bibbey, 4th Hussars; Harvey, 5th Lancers; Verelst, 11th Hussars; Wardrop, 12th Lancers; Spilling, 13th Hussars; Beck, 15th Hussars; Davison, 16th Lancers; Gough, 18th Hussars; French, 19th Hussars; and Graves, 20th Hussars; and in the infantry—Laye, 1st Scottish Rifles; Courtenay, 1st Royal Sussex Regiment; M'Causland, 1st Welsh; Sparkes, 1st Derbyshire; McCleverty, 2d Derbyshire; Bayly, 1st Royal West Kent; Partridge, 2d Royal West Kent; Ravenhill, 1st Shropshire L.I.; Knox, 2d Shropshire L.I.; Wade-Dalton, 2d Middlesex; Studdy, 2d Manchester; Essex, 2d Gordon Highlanders; Barnard, 2d Royal Munster Fusiliers; and Kerr, 1st Royal

Dublin Fusiliers—all under 44 years—surely a good sprinkling of young officers to represent the British service. It has long been the aim of the War Office to create a system which would give us young and vigorous officers to command regiments. In this it has succeeded.

SIR :—I notice in your issue of Sept. 27, a paragraph summarizing some calculations I made concerning promotion in the Royal Artillery based upon regulations since altered. These calculations were made last year. At that time it was to be expected that a large proportion of the majors of 1884, 1885 and 1886 would accept half-pay promotion on concluding seven years' service in that rank. Most of these officers would be brought in again in their proper rotation, and would thus cause the block in promotion which you quote. But now the conditions are altered, so that it is no longer necessary for these majors to take their promotion exactly at the conclusion of seven years or not at all, but they may defer it until such time as it may suit them to apply for it. The effect of this is, that whereas formerly any major of the above period who might by any chance reach the age of superannuation (48 or 50 years) would take the promotion to save himself, and many, if not most of the others, would take it to avoid wholesale supersession, it is now likely that very few will wish for it with the consequent exclusion from regimental employ. I have therefore lately sent to the Royal Artillery Institution another forecast, in which I estimate that, instead of rapid promotion for a few years and then a block, there will be slower promotion throughout, tending to increase the periods in the ranks of major, captain and subaltern from 8 years, $7\frac{1}{2}$ years, and $8\frac{1}{2}$ years, as at present, to 10 years, $9\frac{1}{2}$ years, and 10 years five years hence, and to 9 years, 9 years, and 12 years ultimately, when increased age will cause more rapid retirement amongst the senior majors. The number of captains and subalterns have been largely increased during recent years. The present junior subalterns have consequently a prospect of much slower promotion. The senior subalterns commenced with fewer above them, and have gained much by the augmentation of the captains. I have thought it more satisfactory to send you this explanation, so that your readers may not imagine that your quotation refers to my most recent calculations.

I am, etc.,

EDGAR KENSINGTON, Lieut.-Col.

Royal Military Academy, Woolwich, Sept. 27.

—*Army and Navy Gazette*.

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that as far as practicable these "Comments" should appear under authors' names.)

I.

"Meritorious Discharged Soldiers."

Gen. Henry L. Abbot, Colonel Corps Engineers.

THE paper on this subject by Mr. Bloom, in the September number of the JOURNAL, raises questions which must attract the attention of every one interested in the improvement of our military system. How to check desertion has been discussed of late from many points of view, and modes have been suggested looking to securing a better class of recruits, increasing the physical comforts of the soldier, reducing his discomforts, restricting arbitrary exercise of authority on the part of officers and non-commissioned officers, providing readier modes of obtaining an honorable discharge when desired, etc. If it were practicable to make service in the Army a stepping-stone to desirable civil employment after discharge, I think an inducement to good conduct would be offered more powerful than any which has yet been tried. In sober truth we all know that complaints against Army life are rarely well grounded. The men in general are well fed, well clothed, well treated, and should be content if only an attractive future were open to them when they wish to marry and quit the colors. At present there is none. His good Army record counts but for little in popular estimation, and too often the old soldier must subject himself to the senseless tyranny of the "walking delegate" before he can hope to earn an honest livelihood.

I think, therefore, that our thanks are due to Mr. Bloom for his suggestion that some mode be sought by which officers can aid deserving men in obtaining in civil life suitable rewards for distinguished Army service.

Whether such a plan as he has outlined can be carried into effect in this country, is in my judgment, to say the least, doubtful. Under any circumstances, I think efforts should be restricted to the Regular Service; for too long a time has elapsed since the Civil War to make the plan applicable to our ex-volunteers, and the organization and character of service in the National Guard are too unlike those of the Regular Army to warrant an attempt to include both in one system.

I long ago suggested, but thus far without success, the trial of a plan to aid deserving ex-engineer soldiers in obtaining civil employment under Government; based on a system now in successful use by the Royal Engineers of England. Extensive civil and military works are usually in progress under charge of our Corps of Engineers. The habits of discipline and much of the special training of the soldiers of the Battalion of Engineers, admirably qualify them for the duties of foremen and mechanics on such works. At present, however, the officers in charge have no ready mode of learning the names and qualifications of the discharged soldiers. A Quarterly State-

ment of duties, addresses, etc., is distributed regularly from the Headquarters of the Corps to all the officers, and no doubt a properly prepared list of deserving ex-soldiers would be added if requested. I think benefit to worthy men and good to the Service would result. The Quartermaster's Department employs great numbers of mechanics and laborers; and if supplied with such lists from the different regiments similar advantages would be extended to the other arms of service.

Although new in this country such a plan is not new abroad, and its success there places it beyond the sphere of untried experiments. The plan adopted by the Royal Engineers is the following: The *R. E. Journal* is printed monthly at Chatham and distributed throughout the Corps. This paper contains a "Register of Discharged Non-commissioned Officers and men of Royal Engineers wanting employment." The list contains for each name, the age, number of years of service, whether single or married, (and if the latter the number of children), the trade or special qualifications, and the character expressed in graded language. Great care is taken to make the latter statement trustworthy, all officers of the Corps being requested in a paragraph following the names to look over the list and to communicate to the Secretary of the R. E. Institute (who has charge of the publication), confidentially, anything they may know for or against the men seeking employment: "remembering that every good man who obtains a situation will probably open the road to several others; but, on the other hand, every bad man employed brings the agency into discredit, and therefore closes the market against a number of good and deserving men." The August issue of the *R. E. Journal* contains twenty-seven names on the list, and four good positions were obtained during the month. Correspondence with the agency is conducted through the "Secretary, Discharged R. E.'s Employment Registry," (probably a non-commissioned officer) "Care of the Adjutant of the School of Military Engineering, Chatham."

It is always well to begin experiments of this character on a small scale, and I see no reason why such lists may not be prepared and distributed at the different regimental head-quarters, and be made good use of by officers having occasion to employ civilian labor. The plan at least promises better results for our Service than the more ambitious organization of the Corps of Commissionaires. Indeed it appears that a recent attempt to establish a branch of this corps in Australia with a view to provide employment for old soldiers retired from service in India, has failed. The unemployed in the Colonies are supposed to look with disfavor upon the organization. The Trade Unions in this country would doubtless take similar ground against establishing such a corps here; but they would be powerless against employment by the Government in the manner suggested.

Bvt. Brig.-Gen. Thomas M. Vincent, Asst. Adjutant-General, U. S. A.

In this era of progress, a recruit should not be permitted to enter the Army, unless he shall have become identified with a community, and be vouched for by its respectable inhabitants.

Thanks are due to the author of the article: "Meritorious Discharged Soldiers," as published in the September number of the JOURNAL. Thoughtful attention should be extended to the article by all who are interested in the welfare of the Regular soldier, suggestive, as it is, of a Corps of Commissionaires, wherein the honorably discharged soldier would be received, and provided with means of gaining a livelihood in civil life. The publication is particularly valuable and timely, in connection with the present efforts of the Government to induce worthy young men to enlist.

As the meritorious discharged soldier is inseparably connected with the character of the enlisted force of the Service, the subject naturally leads to the starting point—

entrance to the Service. If worthy young men do not enter the Service, it will be very difficult to find a personnel adapted to the proposed end.

That a bad element—the deserter class—formed of repeaters, wanderers, tramps, floaters, skippers, nuisances, etc.,—unreliable men who were never stable in civil life, and who enlist simply as an expedient to bridge an exigency—is found in the Service, is beyond dispute. It is there notwithstanding the great care of recruiting officers in making enlistments; care is exercised, as indicated by the rejections, during the fiscal year ending June 30, 1889, of over seventy per cent. of the entire number of applicants for enlistment. The bad element is not inherent in the military service, but an offspring of civil life. And if encouragement in civil life is to be extended to the soldier after his discharge, it is reasonable to claim from civilians an honest effort which will assist in keeping the class from which desertion springs out of the Service, so that, thereby, enlisted men of character will have secured to them increased contentment; also that men of high character—those who can be vouched for—will be induced to enter the Service and advance its standing and dignity. It is needless to add that the loss and injury to the Service from desertions, other than from the tramp class, is a trifle. Until recently, under the interpretations of law (Supreme Court Reports, Vol. 6, 1886), a civil officer could not, in the absence of a military order, arrest and restrain a deserter, and the law seemingly favored the deserter. But now, through the Act approved June 16, 1890, United States Marshals and their deputies, sheriffs and their deputies, constables, and public officers of towns and cities, can apprehend, arrest, and receive the surrender of any deserter from the Army, for the purpose of delivering him to any person in the military service authorized to receive him.

But while the law does not any longer favor the deserter, civilians, generally, do not view desertion as a crime; and the views of the people may be considered as expressed by the *New York Times*, in the autumn of 1884, as follows:

“Desertion in time of war, especially desertion in the face of the enemy, is a mark of cowardice, and is therefore held by everybody to be ignominious. But a soldier who deserts in time of peace is taking the only way open to him to be rid of a bad bargain.

* * * “A breach of contract made by an enlistment is no more disgraceful than the breach of the contract made by an agreement to serve a specified time in a mill, or a factory, or a printing office. It is in either case personally disgraceful to a man not to keep his contract.” * * *

Deserters, of course, have not the appreciation necessary to the recognition of personal disgrace. Still should they be encouraged to commit crime, and thereby be placed en route to the military prison? On the contrary, they should be encouraged by the old cry of the people, when their sons and friends were on the eve of battle: “Warriors go; with prayers and blessings we your path will join.”

Desertions were excessively numerous in the Revolutionary War, in the War of 1812, in the Mexican War, and in the late Civil War, all when the armies were composed, mainly, of irregular forces. Consequently the evil cannot be said to attach simply to the Regular Service, wherein more *discipline* is found. It must be remembered that with our vast increase of population the bad element has been greatly multiplied, and, consequently, its tendency to drift into the military service is far more extended than formerly. The enlisted force of the Service is far from a proportional increase. As a result, we find, for the year ending June 30, 1889, an increased percentage of desertion (not astounding when compared with that of other peace times*) standing forth most prominently, aside from some minor demoralization in other respects.

* The total number of desertions for the year ending June 30, 1889, was 2835, out of an enlisted legal strength of 25,000.

The mountain stream must not, as to purity, be condemned because it becomes polluted with mineral poison through feeders, often over golden sands, entering its course. The stream can be tapped above the feeders, and the pure water made to serve its healthful purpose. The volunteer armies of the late War must not be condemned because they were polluted by deserters and bounty jumpers. The pure current of healthful force found its level, and the pollution did not destroy the reputation of the armies; the uniform was considered a badge of great distinction. And the application of the principle, to our small Regular Army of to-day, will enable the current of its enlisted force to be directed so as to serve and strengthen every place wherein the honorably discharged soldier may fix his home.

We have reached the point, so long desired, when it is "practical for a soldier to terminate a *contract*, with which he has become dissatisfied, in a fair and honorable way," and to "make his punishment as sure as possible if he attempts to terminate it in a *dishonorable* way." The deserter-tramp class thus attended to, there will not be any difficulty as to the other portions of the enlisted force. It can readily be improved by the strong, healthful influences found at all posts, influences equally as intelligent and extensive as those found in civil communities of equal numbers; for it can be said, with truth, that to divide our 25,000 enlisted men into 50 communities of 500 each, or 100 communities of 250 each, and place them side by side with towns and villages embracing an equal population of males, moral superiority and sterling worth in every instance, would be found on the side of the enlisted man, who, as an essential part of the military establishment's foundation, has made it possible for civilization to advance over the broad domain of the American republic—the "child of experiment, irreproachable as a creation of pure reason," which has risen up "beyond the seas, to serve as a beacon to all future societies."

The recent act of June 16, 1890, in connection with other legislation, regulations and orders promulgated within the past recent months, are not for the benefit of the tramp-class, but, on the contrary, intended for the encouragement of intelligent, worthy young men. The entrance to the Army is to be carefully guarded, and the soldier, once in its honorable service, is to realize through experience gained in contact with honorable comrades, that he can, and will, "bear true faith and allegiance

The average enlisted strength of the Army for the years 1830, 1831, and 1832 was 6091; and for the years 1834, 1835, and 1836—6902.

In connection with the foregoing, the following is of instructive interest:

"The advance bounty allowed under the previous law was abolished by the Act of March 2, 1833. The number of desertions in 1830, 1831, and 1832, was four thousand one hundred and nineteen, (4119) being an average of one thousand three hundred and seventy-three (1373) during the last three years that the bounty of six dollars was paid in advance to each recruit.

The number of desertions in 1834, 1835, and 1836, was two thousand three hundred and four, (2304) being an average of seven hundred and sixty-eight (768), instead of one thousand three hundred and seventy-three (1373) or an annual reduction of six hundred and five (605) nearly one-half, during the first three years after withholding the bounty; and, in the aggregate, one thousand eight hundred and fifteen (1815) desertions less in the three years.

The number of infantry and artillery recruits enlisted in the first three years after abolishing the bounty exceeded the number enlisted during the last three years it was allowed, three hundred and ninety-three (393); while the number of desertions immediately after enlistment, or prior to joining companies, was two hundred and six (206) less.

This analysis has necessarily been restricted to the artillery and infantry; but, if the two regiments of dragoons be included (added to the peace establishment in 1833 and 1835), the number of desertions from the whole Army, in the three years ending December, 1836, will yet be one thousand four hundred and eighty-three (1483) less than the number which deserted from the artillery and infantry regiments during the three years ending December, 1832; while the enlistments, during the former period, exceeded the latter by one thousand four hundred and eight (1408)."

The enlistment loss in money, by desertion, in 1830 was \$102,087. (Doc. 305. H. R. 25th Cong.)

to the United States of America," and that he "will serve them honestly and faithfully." * * *

"Good character" is one of the pre-requisites for enlistment, but experience has indicated the difficulty of keeping bad characters from enlistment. As a result, poison has mingled with the pure stream, and the public, losing sight of the cause, is inclined to condemn the entire flow.

So positively is this the case, that the uniform of the enlisted men, instead of being viewed as the badge of worth and true manhood, is considered sufficient to bar the man from respectable recognition. The enlisted man, in civilian dress, can openly and freely associate with persons who, *when he is in uniform*, will pass around a corner to avoid him!

The remedy is in the hands of the civilian, and can be made effective by the civilian lending his influence to guard the entrance to the Army, and for the protection of the soldier's character, not only while he is in the Service, but particularly when he is honorably discharged from it. Then will that influence be of value to the Service, and not aspersive of it, as in the following extract:

GOING FOR A SOLDIER.

1. Can I enlist in the United States Army at Chicago? 2. To whom should I write for information as to the duties of a soldier? WEST.

Van Buren County, Mich.

1. You can, but don't if you are good for anything else. 2. Write to the Superintendent of the Recruiting Service, United States Army, at Chicago, or elsewhere. Better still, ask some good old soldier."—*Semi-Weekly Tribune*, New York, Friday, September 12, 1890.

Don't (enlist in the United States Army) if you are good for anything else!

The foregoing language is that used in times of peace. It is not that of the people when the dark shadow of trouble is found in their midst, as during the riots of 1877, when, from all available points, small forces of Regulars were moved, with the utmost speed, to disturbed centres. Governors of States were then found begging the Department of War for a few Regulars, and to picture the acclaim received by the troops, as care-worn and travel-soiled, they entered great and prosperous cities, to afford protection to life and property, one may be pardoned for borrowing from a Latin orator:

"What shall I say of that day, when your city, after having so long desired and expected you, beheld you enter it? Neither age, sex, nor health could keep anybody from so unusual a sight. The children were eager to know you. The youth to point you out, the old to admire you; and even the sick, without regard to the orders of their physicians, crept out as if for the recovery of their health, to feed their eyes on you. Some said they had lived long enough, since they had seen you; and others that they only now began to live. The women rejoiced that they had children, when they saw for what prince they had brought forth citizens, for what general, soldiers. The roofs were all crowded and ready to break down under the numbers upon them; the very places where there was scarce room to stand and not upright, were full. The throng was so vast in the streets that it scarce left you way to pass through it, while the joy and acclamations of the people filled all places, and resounded universally to the heavens."

It is clear, in the light of recent reforms, that the Government will do all it can to eliminate the bad and to preserve the good elements. The people, it is believed, will come to realize the fact that an enlistment, *founded on a solemn oath*, is far above a contract made by an agreement to serve a specified time in a mill or a factory. And the way will thus be prepared by the acts of a generous Government, assisted by a well-inclined people, to give additional significance to an "honorable discharge" by making it so valuable that a soldier after five years' service—a veteran after ten—will find it an immediate passport, not only to a "Corps of Commissionaires," but to other honorable and remunerative positions.

The Corps of Commissionaires once established, it could be made a most valuable adjunct to the Army recruiting service, through the employment of its members, to select candidates for enlistment. Due to their military experience, the Commissionaires would be well qualified to investigate the character of the candidate for enlistment by ascertaining his associates and habits; whether married or single, and particularly to verify the statements made by him during his physical examination for enlistment. As requital for the services so rendered, the Government would economize by extending a liberal fee for each accepted recruit.

Briefly the Commissionaires would be practically members of recruiting parties; and, as residents in towns or localities, be situated so as to supply a great want, now recognized by all our recruiting officers.

The vast amounts now lost by the Government through desertion and discharges of men with unreliable character, would, in part, be saved by remunerating the Commissionaires.

An impetus, at an early date, can be given to the movement by the authorities connected with the coming international exhibition, to celebrate the four hundredth anniversary of the discovery of America, taking steps to employ the veterans who are taking their discharges from the Service under Section 4 of the Act of Congress, approved June 16, 1890.

The foregoing is, mainly, in connection with the Regular Service; but the corps could be further recruited, as well indicated by the article upon which these remarks are based.

The organization of the corps should receive energetic encouragement from the Grand Army of the Republic.

Colonel Richard I. Dodge, 11th U. S. Infantry.

The article in the September number of the Magazine entitled "Meritorious Discharged Soldiers," is interesting, but I am by no means satisfied that the system has such advantages as would commend it to the Regular Army of the U. S.

Our people seem to have entered upon a wild struggle for money. Employés combine forces against employers, and these retaliate by forming enormous trusts. Politics has degenerated into a mere combine for the spoils. Organization and combination, so valuable in themselves, are made the means of wrong to every class of the community.

The Regular Army has so far kept itself aloof from this craze, and every true lover of the Service will do his utmost to keep it so.

I cannot believe that such an organization as that proposed can result in any pronounced benefit to the Service, or to the individual soldier, however meritorious.

Its effect on the Service would be to tempt many valuable soldiers to leave the ranks while they had yet capability for years of active work.

Its effect on the individual "meritorious discharged soldier" would be to put him into a machine in which his personal liberty would be ever less than when in the Service, and where his tenure of office would be implicit obedience to the behests of a committee who thus become masters, not only of his pocket but of his vote, and his whole personality.

To command the confidence of the community, such an organization as that proposed, must be conducted on the most rigid rules. The "meritorious soldier" while in service might get on a spree, or out at night, or absent when wanted for some duty with the result of a few days in the guard-house, or a small stoppage of pay. The same offence of the "meritorious discharged soldier" would result in dismissal, and an almost impossibility of obtaining employment elsewhere.

What with the pension laws, the Soldiers' Home, and retirement our "meritorious discharged soldiers" have little to complain of.

To my thinking such a system or organization as that proposed would result in more harm than good, not only to the Service, but to the "meritorious discharged soldier."

Colonel John Hamilton, U. S. A.

Scarcely any industry or way to support now starts up in our country till it speedily falls into the hands of organized capital. Journeymen have fallen into the hands of contractors, skilled mechanics are turned into operatives, etc.

When in New York in 1849, a professional messenger boy could not be found to run an errand. Some years later a few antiquated specimens used to hang about the corners round City Hall Square, with a red flannel band round the cap to show themselves ready for messenger duty. Soon after, with a spring, capitalized messenger companies were organized, and then it was farewell to individual industry in that line.

In our country, where Government leaves its common carrying to private companies, it is natural, just—and probably thus the public is best served—that the servants grow up in the service, passing through its grades by a kind of graduation, and thus the best are secured for their suited positions.

And so with other industries.

The governments of European nations have many places of reward for the retired defender of his country. They have the far-sighted policy to make such service an honorable one during its active continuance by assuring to it honorable recognition afterwards.

In accordance with our present system of army organization it will be a difficult task to say where a system of beneficency should commence. Excellent thinkers, practical field and garrison officers, statesmanlike in views, beyond the mere machine-like thought of their profession, believe that for the great majority of enlisted men, a service of three years is all that should be permitted. When a capacity for command, accounts, or instruction is developed, let such men be kept as the leaven for the new lump. No wrong is done the man of one-term service. Neither has he imposed any obligation on Government more than he would have done on a civil company for his employ for the same time, which is not provided for by pension laws. He returns to civil life carrying with him a good practical military knowledge of what should and what should not be exacted from the soldier; he returns improved in manners, in self-control, and in morals. Where one man's morals have been impaired by the Services, ten men's have been improved. Where in the Services you find the debauchee, the chances are ten to one that he brought his tastes in from civil life. The facilities to get rid of such men should be still increased, for as soon as military officers turn themselves into correctionary moral reform societies they are squandering the people's money; turn the rascals out, is the cheapest way, and let civil society manage its own dirt with cheaper and more effective machinery. This, an episode.

But, still, and yet, a large class of worthy soldiers and sailors, with considerable work still left in them, will be thrown by the exigencies of the Services upon the cold world, and to whom an organized helping-hand would be a godsend.

I feel great sympathy with Mr. Bloom's paper, and it has the advantage of being a word well said at the right time. It has apparently the grand advantage of practicability. When we see how many benefactions to the human race are now-a-day organizing, why should we despair of some enthusiastic humanitarian laying hold on and working up this philanthropy, giving it its first impulse.

Time certainly presses; avenues to individual support are filling up and closing

by organized monopolies, and organized bodies alone can contend for them. The most worthy old soldiers, men of established character, have failed to obtain positions they were eminently fitted to fill, because they never entered the corner rummery where the political slate of their district was made up. One case in the writer's knowledge, where the old sergeant was backed by comrades of the G. A. R. of the same post with the dispensing patron. He could not oppose the ward pull, and a young heeler got the place. Organization is needed to fight such influences.

It certainly would appear that an organization which could give reasonable guarantees of character to its protégés would become a popular resort for general employers. Something of the kind is to be found in cities where a Grand Army Headquarters is organized. These ameliorate the condition of many old war veterans and their widows and orphans by finding them employment.

A number of ways suggest themselves for its making the institution self-sustaining. One striking me, just now, that soldiers and sailors anticipating retirement or discharge should, monthly, for — years pay into its treasury \$—, if they hope to ever advantage themselves of its services.

What other class of men shall be admitted to the benefits of the beneficence may safely be left to the future. One thing must be steered clear of, viz., separate military organizations—they would at once become antagonistic.

The whole should not be a matter outside the serious consideration of the active officer, for, beyond the question of sympathy due to a common service or a common peril, some security of employment after his service gives the present active man a greater dignity, and is a kedge anchor to character.

Colonel Edward P. Vollum, Surgeon, U. S. A.

I saw a good deal of "The Corps of Commissioners" Mr. Bloom mentions in his article during my rambles about London in my several visits there, and I was always impressed with the appearance of reliability, self-respect and soldierly bearing. They fill a place in the great city that no common every-day men could, for every one knows that they have had an honorable career in the public service, and have the stamp and endorsement of official approval, which justifies their employment without a moment's inquiry as to their fitness upon services of a confidential nature, such as custodians of offices, door-keepers, and as messengers intrusted with money, letters, and parcels, etc. Their respectable personal appearance and attractive uniforms, give a certain tone to the hotels and other places where they are employed. The service they render is of a kind that belongs to mature, trustworthy men, rather than to messenger boys, as will appear upon a little reflection. I believe with Mr. Bloom, that there is an opening in this country for a corps similar to "The Corps of Commissioners" in London. I am sure that honorably discharged men from the Army, Navy, Marine Corps, veterans of both the Union and Confederate services, would find employment in such a corps, where they could make a respectable living in the performance of a peculiar class of services, that only such men would be intrusted with. There is a place in this country for such a corps, and plenty of good men to belong to it.

Captain James Chester, 3d U. S. Artillery.

The organization of honorably discharged soldiers for mutual help, on the lines of the London Commissioners advocated by Mr. Bloom in the September number of the JOURNAL, is a fresh field for some enterprising philanthropist, but it is doubtful if it can be cultivated to advantage so far as ex-soldiers of the Regular Army are concerned.

The old soldier element in civil life, even when the term is restricted to honorably

discharged soldiers of the Regular Army, must be considerable, and it might seem strange to a casual observer, that no organization like that advocated by Mr. Bloom, has ever been attempted in this country ; but when one comes to consider the status and privileges of honorably discharged soldiers it seems less surprising.

The ex-soldiers of the Regular Army who left it honorably and are now in civil life, may be classified under the following heads : 1st. Retired enlisted men. 2d. Soldiers discharged after twenty years' service. 3d. Soldiers discharged for disability. And 4th. Soldiers discharged at the end of their first term of enlistment.

The first class being amply provided for by their retired pay, need not be considered. They are as a rule excellent men, and the majority of them, perhaps, have been retired as non-commissioned officers. They need no help and are sure to find friends wherever they go.

The second class consists of men who have soldiered too long to feel comfortable in civil life in any position. The barrack-room has been their only home for so many years, that a few months' experience in civil life arouses in them a desire to return to it, and as a rule, they find their way to the Soldiers' Home. They have been accustomed to guidance and government, and have had some one to do the thinking for them for so many years, that the so-called liberty of civil life has no charm for them. It is doubtful if this class would appreciate the benefit which might be derived from the proposed organization.

The third class consists of two sections. The first section is composed of men discharged for disability contracted in the line of duty, and the second of men discharged for disability not so contracted. The first section is entitled to pension, which, however, may be such a miserable pittance, that it must be supplemented in some way or the pensioner cannot exist in civil life. Men of this class would undoubtedly be benefitted by the proposed organization. Still even this class need not fear absolute destitution. The Soldiers' Home always stands between them and the poor-house. Men of the second section are to be pitied. They are thrown on the world in a disabled condition and cannot claim any of the benefits and privileges accorded to the first section. Still army service is in no way responsible for their condition. They are men who would have fallen by the way side, even if they had never worn uniforms, and although they are objects of charity, they are not so because of their military service.

The fourth, and perhaps the largest class, may also be divided into two sections. The first is composed of young men whom love of adventure, difficulties with friends, or temporary congestion of the labor market has driven into the Army. They serve honestly and faithfully during their five years, but they never lose touch with their home relations. When their time expires they return to their friends, and are reabsorbed into civil life, and after a few years almost forget that they have ever been in the Army. The second section of this class is composed of what may be called the tramp element. They have never stayed long in any one place. Necessity, perhaps, drives them into the Army, but they never feel at home in it. The restraints of discipline are irksome to them. They take no satisfaction in the Service, and give none. At the end of their term, they and their captain part with mutual satisfaction, and they carry their discharge into civil life as a kind of capital, the interest upon which should maintain them in some easy situation all the rest of their lives. These are the men who would be most prominent in any organization for the benefit of honorably discharged soldiers. Such an organization would furnish them with the needed base of operations. Its uniform would emphasize their declamations upon the immensity of the debt which an ungrateful nation owed them for their services in the Army. Upon the whole, we doubt the necessity for such an organization in this country.

Major James Jackson, 2d U. S. Cavalry.

What becomes of the discharged men is often a matter of serious thought to company commanders, with whom these men have served for years, and to whom they have become attached in the varying circumstances of duty and responsibility under which they have been thrown together. A commander never loses a good man without wishing him a prosperous future, and is always pleased to hear of his well-doing. Many of these men, measurably through the discipline received in the Service, have become prominent citizens and are now occupying places of honor and profit, or, have settled down to business pursuits and are prospering beyond the need of any assistance, but there are many who, not desiring to spend a whole life in the Army, go out to become the buffet of fortune, are forced by dire necessity to forego making homes for themselves and either drift back into the Army for life or take to evil courses. To such men, valuable citizens from their military training, an association similar to the "Corps of Commissionaires" described by Colonel Bloom would be an efficient help and to the business community a boon. Owing to the paucity of our Regular force such an association could not have the same extent of usefulness in this country as in England, but by including the National Guard its organization might be worth attempting in some of the large cities. It would help to draw together and keep together a trained and conservative element upon which the Government could depend in emergencies.

The "veterans" are passing away—withstanding the length of the "pension roll"—and the Nation will need in the future, to keep track of, organize and utilize all those who have received a military training in its Regular Army, Navy, or National Guard. To enroll these men in a corps and assist them to honorable and useful employment under conditions similar to those described would be a worthy labor, helpful to the men, valuable to the country.

Captain Edward Walter, Corps of Commissionaires.

I am much obliged for the September copy of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, and have read your account* of this corps with much interest. There are naturally some inaccuracies, but none of vital importance, as regards the objects or management of the institution; and I can only say that if the officers of the Army and Navy of the United States and their friends should at any time think of starting a corps of their own on similar lines to that established here I shall be happy to assist them in doing so, provided they will credit a retired officer and a non-commissioned officer to me for a month or so in order to get a practical acquaintance with the principles and details of our work. Nothing else than this, I am convinced, would be of use. * * * There are two points on which you would do well to follow our example here. Firstly, to have nothing to do with Government or the numerous class of philanthropists and society patriots. Secondly, to abstain from taking subscriptions or other aid except from those who are in the position of gentlemen, and are perfectly free from all professional politics. You will require pecuniary assistance only for the salaries of the officers, consequently this should not be in any way derived from the men or from those who are not in the same social position as the officers themselves.

Our members have nothing directly or indirectly to do with the management of the Corps; I have vested this exclusively in the hands of the officers of the Army and Navy. The men pay such taxes as are necessary to defray their own expenses, and have simply to do this and obey the rules they have signed in order to get certain

* This is an extract from a letter to Mr. Bloom.

employment, and twenty per cent. better wages than they could procure for themselves.

Will you give my compliments to those gentlemen who have written to me on the subject of your article, and say that if any officer comes over here I shall be happy to see him. In the accompanying copy of our annual circular, page 7, you will observe that with the exception of the Dowager Marchioness of Westminster, three-quarters of the officers' endowment fund has been derived from the officers of the Regular forces. They are consequently not only the most competent but most natural trustees of the future interests of the men they have trained.

BARRACKS OF THE CORPS OF COMMISSIONAIRES,
London, Eng., Oct. 1, 1890.

II.

"The Place of the Medical Department in the Army."

Bvt. Major John Brooke, Surgeon, U. S. A.

IN his criticism on Woodhull's "Place of the Medical Department in the Army," Captain Chester makes the following statements :

"Medical Officers were not members of the hierarchy of command, and were therefore ineligible to sit as members of courts-martial * * * Indeed it was the recognized and ruling custom of the Service as late as 1865," * * *

"But the War being over and the harvest of brevets gathered, * * * Medical Officers were therefore placed upon the roster and detailed as members of courts-martial by virtue of their brevet rank."

Further on—"they had gotten upon the roster under cover of their brevet commissions. The eye has become accustomed to their presence."

Now the "harvest of brevets" was not gathered until 1865, and my own crop did not mature until midsummer of that year: yet in 1863 and 1864 I did a great deal of duty as member of courts-martial, garrison and general; much more in fact than I have done during a like period since. Judging from the Captain's standpoint "the General or other officers set over him" must have had the sensibility of their visual organs prematurely blunted; and they erred grossly in assigning a Medical Officer as member of a court-martial before he had been admitted by brevet commission into the "hierarchy of command."

For one I have no desire to sit on courts-martial; and I think it would be better if Medical Officers were not subject to such details in any capacity. But to say that we are not *eligible* for such duty is entirely a different matter.

Army surgeons are *officers*, appointed, confirmed, and commissioned by the same powers as are other officers of the Army. They are the peers of such other officers in intelligence, education, and culture; and they know equally well the inner life, the motives and temptations, of the men of the Service.

The legal authority for courts-martial, the Articles of War, simply requires that they shall be composed of *officers*. There is no restriction as to Arm, Corps, or Department. There is no limitation of the general rights and privileges of Medical Officers except the one—that they shall not exercise command beyond their own department. The question—"is it right" that they should sit in judgment? making the point solely on this restriction of their power to command, naturally recalls the times when the only passport to the "hierarchy of command" was the privilege of carrying a sword, or the right to wear a pair of spurs. Attila might have sat on courts-martial; Hippocrates could never have been eligible.

FORT MONROE, VA., Sept. 14, 1890.

Captain C. N. B. Macauley, Medical Dep't., U. S. Army.

In the JOURNAL OF THE MILITARY SERVICE INSTITUTION for September, 1890, Captain James Chester, 3d Artillery, condemns Lieutenant-Colonel Woodhull's reasons for giving military medical officers their military titles.

Captain Chester says (p. 823): "We hardly think Colonel Woodhull succeeds in establishing his case." In all friendliness, I do not think Captain Chester has established his either, for, like most of his brethren who have never given this subject much thought, he sees the traditional side of the shield only. Let me turn it so that he can see the other side.

Par. 2 (p. 823). The title of "assistant-surgeon:" Captain Chester asks wherein this title is less descriptive than that of 1st lieutenant.

In this: 1st. The name "lieutenant" means, literally "place holding,"—liberally—"one holding the place of" (a senior, in his absence). It does not mean "assistant."

That the "1st lieutenant in the military service is and always has been the captain's assistant" may be one meaning of it, but he is never called so.

2d. The title is not even "descriptive of his office." With the exception of his first few months' service the lieutenant of the Medical Corps, in nine-tenths of the cases, is nobody's assistant. My personal experience is that of the whole corps, with possibly here and there an exception. Less than sixteen months of my service has been as an "assistant," the rest of the time I was alone, and therefore, no one's assistant. Practically this is the record of nine-tenths of the so-called "assistant" surgeons. The name is by no means "descriptive of the functions of his office."

3d. It appears to me that it is about on the same footing as applying the name "Cavalry," "Infantry" or "Artillery," as a title to the officers of those arms, and no more.

4th. As a title of address—in speaking to a medical officer—it is clumsy, and is never used.

5th. An assistant surgeon may be either a captain or a lieutenant.—the title fails to describe him in that way. We ask the same particularity as to our rank that the line does.

6th. Colonel Woodhull does not "borrow" what is given by law to all staff officers. I would refer Captain Chester to the Statute, It says: "shall have the rank," etc. Without making a Shylock of myself, I think it is "so nominated in the bond."

Par. 3 (pp. 833-824). Captain Chester admits that the rank of 1st lieutenant "is legal and indisputable," but declares that its character "is tainted by the statute which deprives it of the full functions of command." Paragraph 18, A. R., 1889, (also par. 17, A. R., 1881), say that pay and medical officers "cannot exercise command, but by virtue of their commissions they may command all enlisted men like other commissioned officers."

The medical officer, like his brethren of the Engineers and Ordnance, has enlisted men attached to his department over whom he exercises the same authority as the commanding officer of any troop, battery, or company does over his men. (This by an Act of Congress, 1887, passed since the statute from which the paragraphs of the Regulations are taken, was enacted.)

It looks to me as though this is properly a "function of command." Furthermore, if the medical officer's is a "kind of latent rank, and does not confer on him place or title in the hierarchy of command," what is he doing with a detachment of enlisted men for whose military care and discipline he is responsible? Again, why are paymasters addressed by their military titles when they are in the same category as

medical officers? In fact, why address any staff officer by a military title? Par. 18, A. R., 1881, limits them too. They can only exercise command at the express command of the President. I do not want to drag in too much of my personal experiences, but as an illustration that we have the functions of rank and command, I mention this: Soon after the formation of the Hospital Corps, I received a packet of "Soldier's Handbooks" from the Adjutant-General's office addressed to me as: "Commanding Officer, Detachment Hospital Corps, Fort Gibson, I. T."

I fancy I am not the only medical officer who received those packets similarly addressed.

Par. 4 (p. 824). The lieutenant of the Medical Corps receives no new commission on gaining his step after five years' service, but the law which gives him that step says he "shall have the rank," etc. of a captain of cavalry. We do not claim that it made us captains of cavalry, or captains of anything but our own corps. Had I desired to be a captain of cavalry, I should have gone to the cavalry originally, instead of standing my examination for the Medical Corps,—I had my choice. The law made me a captain of a staff corps, and as such I always have deemed the title mine.

Par. 5 (p. 824). The argument of a lieutenant calling himself "Colonel" because he happens to command a regiment, has no application in this discussion, the lines are not parallel. Colonel Woodhull said nothing in his article that could lead one to suppose that we wish to call ourselves by any but our actual grade,—unless a brevet has been granted.

I cannot confess to having had any desire to sign myself "captain and assistant-surgeon" because while a lieutenant, (and post surgeon of a one company post in Dakota) I was ordered for temporary duty in charge of a post that had head-quarters, band and four companies in garrison, during the absence on leave of the post surgeon (a captain). Nor more recently, did I feel any desire to sign the morning report of the hospital "Major and Surgeon" because the post surgeon was away on detached service.

The last lines in this paragraph say, in effect, that the President confers the title in the commission, and that it is the only title the officer can claim, whether it is descriptive or not. The medical officer's commission does not differ from that of the other staff officers, except in the name of his corps. Why, then, call staff quartermasters and the others by their military titles (which are granted by law in the same way as ours) when they have just as "descriptive" ones as the "assistant" surgeons.

Par. 6 (p. 824). I do not think, with Captain Chester, that "the question is settled by the commission," he must bring "reasons why" that hold together a little better than the ones he gives. Why spring an exception in the name of the rule on one staff corps, and say that "that settles it"? No one thinks of calling quartermasters, commissaries, and the others by their staff titles, why make exceptions?

Pars. 7 and 8 (p. 824). Colonel Woodhull's "plaint" (?) that the title of "Doctor," in military society, means nothing is true in the light of "position (grade) in a military community," like an army. The veterinary surgeon is called "Doctor." I have heard a troop farrier called "Doctor" by the men of the troop. Colonel Woodhull, as well as I, has seen men in the ranks whose right to the degree of Doctor of Medicine was as indisputable as his. I know of one who had the degree of D. D. S., who was known to the men in the company as "Doctor." I have heard the men detailed in the hospital as attendants, and later on, the men of the Hospital Corps spoken to as "Doctor," and also by the very objectionable one of "Doc." It was done in fun by the others.

If the men ever hail each other as "Cap'" or "Loot'nint," or even the unabridged names, I have never heard of it. As Colonel Woodhull says, in a military community

the military title is the only one handled with respect,—and a civil one is out of place. In civil life this makes no difference, but in military life it does.

Medical officers are the only staff officers continually with troops. Many of the others never see a Regular soldier,—some, as Captain Chester knows, have never seen one, and wouldn't recognize him if they did,—are given their military titles without question.

Undoubtedly the title "Doctor" is the highest degree of the learned professions, but it is a civilian title, and those same learned professions have their ranks or grades, but with civilian names. (LL.B., LL.D.: B.S.,—M.S., M.B.—M.D., etc.)

In civil life these are well enough, they show a rank, but they show nothing in military society. Medical officers have duties which they would not have outside of the Army.

Pars. 9 and 10 (p. 825). How many officers who have seen no war service, (civilized or savage) look at "non-combatant" in the light that Captain Chester sees it? To the unthinking "non-combatant," as Colonel Woodhull says, means: "One who is mysteriously protected from all risk," or "whose duty is always discharged at the rear and in complete safety." A large majority would give these latter definitions, rather than the former. This is not mere statement, I have heard it defined several times.

Medical officers do not ask their military titles as a certificate of bravery, it is asked on the same ground that other officers desire theirs,—to show where they stand in the different grades of the "military hierarchy."

Pars. 11 and 12. There are no books at hand to which I can refer on the point raised in this paragraph, as to what was the cause of the controversy over the eligibility of surgeons, chaplains, and paymasters to sit as members of courts-martial. I think, and I believe I am right, that an Act of 1866 (?) reorganizing the Medical Department, placed medical officers on the same footing as other commissioned officers.

The customs of Service have changed,—those *ante bellum* to the contrary notwithstanding. The comparatively recent Act creating the Hospital Corps (1887), has removed the "taint" from the medical officer's commission, and has made him a member of the "hierarchy of command." Par. 13 (p. 826), is the first statement I have seen that laid the sitting as members of courts-martial, to the brevet commissions held by medical officers.

Par. 14. Dragging the chaplains into the argument seems to me to be begging the question a little,—they are not in the same category. However, as it is done, an answer is ready to the statement that "Chaplains do not appear to have been admitted to the roster." The chaplain at this post, Fort Supply, I. T., has only recently returned from another post where he was ordered, with two line officers, as a member of a general court-martial; he was, later, judge-advocate of a garrison court here, and is, at the present time (September) president of another.

Par. 15. With regard to its being distasteful to line officers that the medical officers should be known by their military titles. It is not invariably so because I know many who willingly give these titles when it is so desired. I heard a general officer, a soldier through and through, say he intended in future to use the military titles when he knew the officer had no objection. That there are medical officers who do not want it, I must admit, but I am pretty sure they are in the minority. I know some others, however, among the seniors, who in talking the matter over, admitted they thought the military title the proper one, and they are men who have the reputation generally of preferring the civilian title.

Par. 16. Captain Chester's shout of delight when he tumbles on Colonel Woodhull's remark that "The President can make no man a colonel in the Medical Depart-

ment," is almost audible. I do not think that is exactly the idea intended. After hearing the paper read, I spoke to Colonel Woodhull about it. There is an old Army saw that says: "The President can make any man a colonel, but he can make no man a "doctor" (physician?). This, if I remember my conversation correctly, was what was intended, for when I said the "President made more physicians in one year than colonels in ten years," by reason of his being *ex-officio*, president of one of the District of Columbia Medical Colleges, Colonel Woodhull said he did not know of it before. The President, as president of the college, has to sign the diplomas of the graduating class, just as the presidents of other colleges do. The diplomas are worthless without the signature.

What, may I ask, does the President do when he promotes a lieutenant-colonel (surgeon) in the Medical Corps to a colonelcy (also surgeon)? Does he merely promote from surgeon to surgeon, or does he promote to be "surgeon with the rank of colonel"? If that is not making a colonel in the Medical Department, it comes very close to it.

* * * * *

I have heard line officers on the plains say that they thought it was singular that the medical officers, who always served with them, "and who are of us as well as with us" should be the only ones whom it is insisted should not be known by their military titles.

This paper has long overgrown its limit, but I would like to overhaul one or two of Captain Cotton's remarks. His memory failed him when he forgot the instances he, as well as almost every other officer, must know of, wherein a commanding officer has solaced "himself with that panacea to others—an order." Illustrations are not needed.

"There is no corps where undue stress laid on the question of rank by its officers, can work such detriment, if not cruelty to those around them, as the Medical Corps." How? Why the medical officers, who, as a body stand less on their rank than any others should have such dark and dreadful insinuations cast upon them, I do not understand. Has Captain Cotton ever known of a medical officer coming into a post and turning the household effects of a junior (who was out in the field) into a tent on the parade? Just that was done by a line officer. Did he ever hear of a medical officer arriving at a post and giving a junior three days to move out, and this junior was married? This was done by a staff officer, within my knowledge.

What other "detriment" or "cruelty" a medical officer can inflict by laying the same stress on his rank that his brother of the line does, is not plain to me.

That any atrocities have been committed by the corps, I have never heard, nor do I think, has Captain Cotton. This is really the first time that I have suspected that line officers have had to stand around with muzzles and straight-jackets in their hands ready to corral and suppress this terrible fellow, the military medical officer, at the first symptom he may show of a disposition to run a-muck. I really had no idea that we were such a terrible lot, or that we revelled unduly in "detriment" or "cruelty to those around us." No doubt Captains Chester and Cotton will think that I am one of these to whom "cruelty" and "detriment" are a delight. I am not, however.

Finally, has it occurred to Captain Cotton that, except the Engineers and Ordnance, the Medical Corps is the only one that has any examination at all for promotion? Has he ever heard medical officers sit down and growl, like a bear with a sore head, at that examination? I have seen officers of other branches wax exceeding wroth over the mere threat of instituting an examination for promotion. We have none on the promotion to captain, but we have for the next grade.

"Heaven help those of us on the plains" if it was not for that examination. No

one recognizes its value more keenly than the detriment working "military" medical officer. "Those of us on the plains do not seem to complain, or call on heaven for help because "the Doctor" takes pride enough in himself and the Service to be "military," whatever "those of us" on the sea-coast may have done.

I have never yet known or heard of one of my corps who allowed his "militarism" to interfere with his duty to his patients, and I have known some who were very "military."

The most "military" medical officer in the Service (whom I have the pleasure of knowing personally), has nearly worn himself out in the care of his patients, but he is very soldierly in his ways, and his hospital would serve as a model in its appearance and working, for any hospital in the world,—it is a model for the Army.

This officer will neglect his comfort,—even his health—for the least sick of his patients. The "detriment" and "cruelty" seem to be on the other side.

Captain Cotton merely glanced at the edge of the shield.

FORT SUPPLY, I. T., September, 1890.

Captain James Chester, Third U. S. Artillery.

Assistant-Surgeon Macauley of the Medical Department, strikes rather widely, we think, at our remarks on Colonel Woodhull's paper, published in the September number of the JOURNAL. We do not propose to follow him outside the issue, and have nothing to add to, or alter in, our original remarks. Still he makes a few statements which can be answered without transgressing that rule.

His explanation of the meaning of the word "Lieutenant" is gratefully acknowledged, but not accepted. We prefer the military meaning given in Worcester, namely, "An officer next in rank below a captain. The second commissioned officer of a company." When we decline in our remarks "to appeal to philology for the origin, history and meaning of any of the titles," we did not mean to confess total ignorance on the subject. But we are much obliged to our critic all the same.

The assertion in the fifth paragraph that "an assistant-surgeon may be a captain or a lieutenant" simply begs the question. Our contention is that he cannot be either.

The reference to our "Brethren of the Engineers and Ordnance" is altogether gratuitous. There is no taint in their commissions. They have an acknowledged place in the hierarchy of command. See par. 16 A. R.

We are glad to be informed that Assistant-Surgeon Macauley had the option of entering the cavalry arm, but we fail to see what that fact has to do with the question at issue. Nor can we understand how the custom of addressing certain staff-officers by the military titles under which they are assignable to command, can be considered an argument in favor of according such titles to staff-officers who are not so assignable.

Like Colonel Woodhull, our critic seems to insist that the words "in the rear" and "in complete safety" have a legitimate place in the definition of "non-combatant." We begin to fear that we must have drawn the lines too tightly in our definition, and therefore turn to the dictionary. Worcester defines the word thus, "A person associated with an army or navy, who is not required to fight." Upon the whole we think our original definition was about right.

Towards the close of the criticism we come upon a refreshing reason why medical officers desire the military title, namely, "To show where they stand in the different

grades of the military hierarchy." Why the contention is "That they have neither place nor title in the hierarchy."

We are asked "What does the President do when he promotes a lieutenant-colonel (surgeon) in the medical corps to a colonelcy (also surgeon)? We answer: The Lord only knows. In the first place there is no such organization in the Army as the Medical Corps, and in the second place there are no such titles as colonel and lieutenant-colonel. We give it up.

Captain W. D. Dietz, Asst. Surgeon, U. S. A.

Kindly allow undersigned to proffer a few remarks concerning recent letters published in the JOURNAL, apropos of Colonel Woodhull's article on "The Place of the Medical Department."

The authors of these communications are Captains Chester and Cotton of the Artillery. Captain Chester's article inclines to the argumentative; Captain Cotton's is rather rhetorical, and characterized by a tendency to deprive the meaning of certain quotations from Colonel Woodhull of its contextual limitations.

Captain Chester in his opening paragraph falls into the error of confounding two things spoken of in Colonel Woodhull's paper,—the military title and the descriptive title. Colonel Woodhull prefers the descriptive title *medical officer* to *surgeon* or *assistant surgeon*, and the military titles,—*colonel*, *major*, *lieutenant*, as the case may be, to the civilian title *doctor*.

Again, Captain Chester objects to the application of the title lieutenant to an assistant surgeon, because a "a lieutenant in the military service is and always has been, the assistant of the captain." If this be correct, lieutenant is not the proper title for a regimental adjutant or quartermaster.

The rank of a medical officer, according to Captain Chester, is given merely to protect his dignity and pocket. That such rank is given to protect the dignity of the medical officer is in the line of Colonel Woodhull's argument, that it was not so conferred to protect the officer's pocket is evident from the wording of the statute. For instance, in the case of surgeons of the rank of major, the Revised Statutes read:

"The Medical Department of the Army shall hereafter consist of * * * fifty surgeons with the rank, pay, and emoluments of majors." In the foregoing, the words *pay* and *emoluments* amply protect the pocket; the word *rank* is needless for such purpose.

Captain Chester argues that the limitations as to command obtaining in the case of a medical officer operate by tainting his rank, to vitiate his right to the title of that rank. Why this should hold in the case of medical officers, when other staff officers, subject to similar limitations are accorded military titles he does not explain.

"The question of title then," says Captain Chester, "is settled by the commission." In making the assertion, however, he has confounded the descriptive title with the appellative. An unchallenged custom of the Service has long since established the propriety of the military appellative for certain staff officers,—commissaries and quartermasters, for instance,—and there would seem to be no valid reason to deny it to the medical staff whose military rank is "nominated in the bond," the Revised Statutes.

Captain Chester states that "the plaint of Colonel Woodhull that the title of 'doctor,' by which medical officers are almost universally addressed in military society 'means nothing' is a somewhat startling statement." He has, however, misread Colonel Woodhull's words, which are to the effect that "*doctor*, in itself means nothing." Viewed in the light of this emendation, and with due consideration of con-

text, the statement will lose many of the startling qualities of its incorrectly quoted form. The parallel drawn by Captain Chester when speaking of the titles "doctor" and "colonel" is hardly a legitimate one. "Colonel" not being subject to the objectionable range of meaning attached to the designation "doctor," even legitimately borne.

On the question of the eligibility of medical officers to sit on courts-martial little need be said. Attention is respectfully invited to Article 75th, which establishes it, *ante-bellum* authority to the contrary notwithstanding. Captain Chester's theory as to how this eligibility came to be established is ingenious but not pertinent, neither is the statement that a seat at the table did not save the man who was without a wedding garment.

ALCATRAZ ISLAND, CALIFORNIA, September 18, 1890.

Reviews and Exchanges.

The Personal Memoirs and Military History of U. S. Grant versus the Record of the Army of the Potomac.*

WITHOUT adopting all the conclusions of this book, still less its remoter inferences, it may be safely said that it is well worth reading. More than that, it is doubtful if the seeker after truth will not be largely profited by the perusal.

The most famous men have their limits, and it is astonishing how soon in some directions they are encountered. Madam De Stael said of Wellington that for so great a man he was made of very small material. There appears to have been a good many chips mixed with the larger blocks of his composition.

If our Great Rebellion terminated at Appomattox, it is certain that the road led by no Marengo, perhaps, because there was no Melas in the problem, though something like the Aulic Council certainly did exist upon one side of the Potomac.

Woman is seldom considerate of her rivals in beauty, and the soldier is often more tolerant of his opponent than of his competitor. If Marlborough and Eugene worked in complete harmony—there is evidence that the harmony had its weak spots—the one looked more to London and the other more to Vienna.

Renown is not so very alarming when it hides itself in a foreign language and has to be spelled out by a dictionary.

Perhaps it is not reasonable to expect any just comprehension of the Greek by the Viking. It is the old antithesis of Art and Force, the man with the axe and the man with the theodolite.

One is careless of obstacles, impatient of opposition, suspicious of delay. The other values method, eliminates accidents and waits opportunity. One marches and the other manœuvres. To the one talk about dispositions and diagrams becomes cant, and to the other muscle and speed seem vulgar. One says, "Let us consider, and the other, "Go ahead."

Both types of men have done a good deal of the world's work, are brought out in every emergency, have been sketched in the *Talisman* with the story of Richard and the steel mace, Saladin and the silken scarf, and both appear in the volume under review.

It takes a long time for a man to recognize his mistakes and longer yet to remedy them. History is a continuous process of readjustment as Thirlwall displaces Mitford and Grote, Thirlwall and Curtius, Grote.

Mistakes then as well as merits are a fair subject of investigation, and there would seem to be little need of delicate scruples in the criticism of the acts and motives of a general who could write of George H. Thomas, "He never can make a campaign there or elsewhere," meaning towards Lynchburg *after* Nashville.

* *The Personal Memoirs and Military History of U. S. Grant versus the Record of the Army of the Potomac.* By Carswell McClellan. Houghton, Mifflin & Co.

But it must be admitted that Grant made something more than a day's excursion to the south side of the Rapidan. He took the Army to Richmond and through it. The job that had been waiting for four years was done at last, and the problem as to whether it might not have been done better is fortunately all that is left to us to discuss.

To that discussion this book is an important contribution.

Speaking, however, for ourselves only, we improve the opportunity to remark that while it is pleasant enough to take a peep into the realm of "Wonderland" we do not care to dwell there.

And as for riding "Behind the Looking-glass," booted and spurred, even with Jomini, it is well enough to remember that in this kingdom of "Might, Could, Would or Should Be," knights, whether white or red, have great difficulty in keeping their seats, and if they can always invent a new pudding it rarely gets cooked, which is just the critical point of the business.

And this is particularly difficult when the materials are "blotting paper and gunpowder," so seldom judiciously used.

The experience of Miss Alice contains many a wholesome moral for the military pen. "The great art of riding," said the Knight, "is to keep your balance properly, like this, you know,"—and the Knight let go the bridle, stretched out both arms to show what he meant—and fell flat on his back right under the horse's feet.

H. W. C.

The Influence of Sea-Power Upon History.—1660-1783.*

The subject of this important contribution to historical literature is broad and comprehensive, and Captain Mahan has brought to his self-imposed task an intelligence and zeal worthy of so great a theme.

The book seems to be in some sort one of the outcomes—and a very good one it is—of that revival of the study of naval history which took its rise in England only a year or two ago. Indeed, some expressions in the singularly lucid and instructive introduction would seem to shadow forth that the conception of the work directly followed certain discussions which took place at the Royal United Service Institution in 1887-89.

Whether discussing the diplomatic events preceding active naval operations, whether describing the elaborate plans auxiliary to or independent of operations on land, or narrating the details of the strategic movements of naval commanders, there seems to pervade the entire work a conscientious impartiality which can alone make a history of any value.

At a time when the historical method is, one might say, but struggling to the front, it was a bold idea to use it in challenging all the historians in a body with neglect of the primary element in the changes of political geography.

Perhaps a broader scope of this most interesting discussion might be embraced under the title "The Influence of Sea-Power upon Civilization." For it is not history alone, but the progress and development of human energies and human thought that have been affected by the evolution of naval power. The development of a people's power on the sea is coincident with the development of its civilization.

How well the story of these great ocean battles has been told by Captain Mahan, how carefully the details of the famous naval engagements that decided the supremacy of the sea for this or that nation has been related; how well the plans explained and

* *The Influence of Sea-Power upon History, 1660-1783.* By Captain A. T. Mahan, United States Navy. Boston: Little, Brown & Co., 1890.

the intricate manœuvres described can only be appreciated by a perusal of this unique contribution to naval science.

It is, according to our author, sea-power, its distribution, and the use which has been made of it, that has had most to do with the positions in which modern nations find themselves, yet the nations have by no means generally realized the fact; and some of them, such as France, have had it in their power to make a choice, and have made a wrong one. It might be stretching the point much further than Captain Mahan would stretch it, yet the thought will intrude as to what might have happened in the late Franco-German War, had France, by the use of her preponderating navy, transferred the main theatre of the war to the German Baltic provinces, and restricted her home operations to a purely defensive attitude along the line of her frontier fortresses. If France had been prepared it would have been an easy thing to do, and it would have remained to be seen whether a German invasion of France and the defense of her northern provinces could have been carried on together.

To exemplify the author's views on the study of tactical naval history, we may take the following:

We may therefore accept now the words of a French tactician, who wrote a century and a quarter ago: "Naval tactics are based upon conditions, the chief causes of which, namely, the arms, may change, which in turn causes necessarily a change in the construction of ships, in the manner of handling them, and so finally in the distribution and handling of fleets." His further statement, "that it is not a science founded upon principles absolutely invariable," is more open to criticism. It would be more correct to say that the application of its principles varies as the weapons change. The application of the principles doubtless varies also in strategy from time to time, but the variation is far less; and hence the recognition of the underlying principles is far easier. This statement is of sufficient importance to our subject to receive some illustrations, from historical events.

The battle of the Nile, in 1798, was not only an overwhelming victory for the English over the French fleet, but had also the decisive effect of destroying the communications between France and Napoleon's army in Egypt. In the battle itself the English admiral, Nelson, gave a most brilliant example of grand tactics, if that be, as has been defined, "the art of making good combinations preliminary to battles, as well as during their progress." The particular tactical combination depended upon a condition now passed away, which was the inability of the lee ships of a fleet at anchor to come to the help of the weather ones before the latter were destroyed; but the principles which underlay the combination, namely to choose that part of the enemy's order which can least easily be helped, and to attack it with superior forces, has not passed away. The action of Admiral Jervis at Cape St. Vincent, when with fifteen ships he won a victory over twenty-seven, was dictated by the same principle, though in this case the enemy was not at anchor, but under way. Yet men's minds are so constituted that they seem more impressed with the transiency of the conditions than by the undying principles which coped with them. In the strategic effect of Nelson's victory upon the course of the war, on the contrary, the principle involved is not only more easily recognized, but it is at once seen to be applicable to our own day. The issue of the enterprise in Egypt depended upon keeping open the communications with France. The victory of the Nile destroyed the naval force, by which alone the communications could be assured and determined the final failure; and it is at once seen, not only that the blow was struck in accordance with the principle of striking at the enemy's line of communication, but also that the same principle is valid now, and would be equally so in the days of the galley as of the sailing ship or steamer.

The various theses which underlie these quotations are worked out in the book with a force and clearness which leave little to be desired. The period of history chosen for illustrating the argument begins with the first Anglo-Dutch war and ends with the close of the war of American Independence. The period is not ill-chosen, and the treatment of the history is generally admirable. The author shows over and over again the enormous effect of properly understood naval strategy, properly carried out. He hardly hesitates to assert that if the French had properly understood the naval problem, William III. could never have fought the battle of the Boyne, and the Whigs would have gone under upon the return of James to his throne. He does not hesitate at all to point out that it was the naval alliance of France and Spain against England, and

not the prowess and determination of the revolted Colonists alone, however great that might have been, which broke the Colonial tie and created the United States. It was indeed declared at the close of the war, that English naval shrinkage by comparison, compelled a peace. The author is particularly happy in showing how the neglect of the French Government to cut the communications between England and Ireland in 1689-90, when they had ample power to do so, permitted the re-conquest of Ireland and compelled the flight of James.

England's prosperity has grown, is now maintained, and only can be maintained, through her naval power.

"Who can deny," he says, "that the Government which with one hand strengthened its fainting allies on the Continent with the life-blood of money, and with the other drove its own enemies off the sea and out of their chief possessions—Canada, Martinique, Guadaloupe, Havana, Manila—gave to its country the foremost rôle in European politics; and who can fail to see that the power which dwelt in that Government, with a land narrow in extent and poor in resources, sprang directly from the sea?" He does not tire of reminding us that in the last century England steadily aimed at widening and strengthening the basis of her sway upon the ocean; and he remarks that those are true prophets, "though they seem to be having small honor in their own country," who warn England that her prosperity at home depends chiefly upon the maintenance of her power abroad.

Our author displays the greatest boldness in his treatment of the tactics of sailing fleets. The points of resemblance between sailing and steam vessels, which render the handling of one a precedent for that of the other, do not escape him. They have the same power to injure an enemy from a great distance, to manœuvre for an unlimited length of time without wearing out the men, and to devote the greater part of the crew to the offensive weapons; long-range guns have still the same purpose, and the smashing effect of the carronade is replaced by that of the torpedo; if the weather-gauge was an advantage in a battle of sailing ships, it was because it gave the power of attack, and the same advantage now lies with the squadrons attaining the greatest speed. Pursuing the same lines, Captain Mahan makes an ingenious comparison between fire-ships and torpedo-boats, remarking that the conditions of the usefulness of one may be a subject worthy of study in regard to the other. There is significance in the hint that fire-ships disappeared from fleets because they delayed the speed. The reduced speed of torpedo-boats in heavy weather is well known; and it will be remembered that the seagoing torpedo craft of Admiral Duperré were directed to leave the fleet and seek shelter during the recent French manœuvres.

In enumerating the elements of sea-power, he very naturally dwells upon the advantages England possesses in her geographical position, and there is truth in his remark that, though by her Colonial Empire, she has sacrificed much of this advantage, the sacrifice has been wisely made, for the gain has been greater than the loss; and adds that it has been too often forgotten that England's leadership in mechanical arts conduces to her naval strength.

The "Sea Power" of a commercial people is therefore the most important factor of its national existence, and the power of its commerce is, as a rule, coincident with its power on the sea. Portugal, which rose to eminence through the boldness and enterprise of its navigators, has dwindled into insignificance, and yet at one time she was pre-eminent in discovery and colonization. Every ocean saw her flag and every continent and many islands received her colonists.

The famous navigators of Holland, who brought to that country the tributes of every clime, and filled her coffers with wealth, were the victorious captains of many bloody sea fights.

Sea power has a broad significance both in Peace and War.

America is *called* a powerful nation, and yet both her Navy and Army are comparatively insignificant.

Just at this time a subject so fraught with interest to the American people has an importance and significance that cannot fail to demand attention. A powerful and world-wide commercial activity has been almost entirely suspended as the one burning result of our protracted strife. While recovering from this disastrous condition, we find ourselves confronted with the fact that a new impulse and a new direction has been given to commercial intercourse by the use of iron and steel. The swift clippers for which America was so famous have been superseded, and to-day the products of the world are brought to us in foreign bottoms, and to foreign bottoms we commit the surplus of our vast resources. How long shall this be? And what is our rank and our power among the Nations while it lasts?

Let us as Americans ponder upon these questions, and while we read with care this elaborate analysis for which we are so much indebted to Captain Mahan, let us hope that Time has in store for us a brighter fortune and a higher measure of Sea Power.

The care with which Captain Mahan pursues his inquiries into the modes by which sea-fights were won, stamps him as possessing one of the brightest minds in our Naval Service.

The statesman who aims at understanding what makes the power or the weakness of a Nation, cannot fail, without negligence, to master the contents of this book, and even the ordinary reader may enjoy the work for the sake of its limpid and flowing style.

"Pawnee Hero Stories and Folk-Tales," Grinnell.

It is not often that a writer possesses the gift of imparting valuable information in language which the simplest may understand and clothed with a grace interesting to both young and old.

Of such a gift, Mr. George Bird Grinnell is the possessor in an eminent degree, and his latest book—"Pawnee Hero Stories and Folk-Tales,"* is one which will be read with pleasure by many officers of the Army, particularly those whose experience carries them back to the days when the plains were "the Plains" indeed, and Indians were "Injuns," and no mistake. There is not a line of the blood and thunder business in it.

It is a collection of stories, taken down, apparently, with little embellishment, from the lips of the older members of the Pawnee tribe, whose feeble remnant to-day can scarcely be recognized as the representatives of the fierce savages who, less than twenty-five years ago, made it questionable whether or not the Kansas Pacific Railway could be pushed to completion.

Where formerly thousands assembled in paint and feathers—clad in beaded buffalo robes—with hair roached so that the head looked like the crest of a Roman helmet—hundreds only can now be counted.

As a historical fact, the Pawnees have been on the down-grade ever since the days of the brave missionary, Father De Smet, who visited them in their lodges on the Loup River, Nebraska, in 1837, when that dire scourge, the small-pox, had swept away three thousand of their people.

From that time, they shrank from the Sioux, although they still carried on their depredations upon the Spanish settlements in exposed sections of what is now New Mexico, and plundered the trains of traders and immigrants on the old "Santa Fé trail."

* New York : Forest and Stream Publishing Company.

With the completion of the Union Pacific Railway, or, perhaps, some time before, they became more friendly in their attitude towards the Government, and a battalion of them entered the military service as scouts, under command of Major Frank North, an excellent and gentlemanly character, to whom this book is appropriately dedicated.

They did good work under Augur, Ord and Crook, and one hundred of them were under the command of the last named in his final campaign against the Sioux and Cheyennes and in the fierce fight on the 25th of November, 1876, in the big Horn Mountains, the last determined effort of those savages to hold that country against the whites.

There are numerous quaint customs of the aborigines cropping out like grass on every page of this interesting book; of these, we care only to particularize those relating to the right of sanctuary, the modes of salutation, that of counting "coup," in battle, the association of two Indian braves in campaign, one remaining by his comrade under all circumstances and braving all dangers; the assumption of new names after each battle, or the performance of some daring achievement, and many other points which may be familiar to most of our older officers, but must be new to the generation which has joined since the pacification of the Indian tribes has been effected.

It is a book worthy of perusal by every intelligent reader, especially if connected with the military service.

J. G. B.

The Pharmacology of the Newer Materia Medica.*

Among our more recent exchanges, we find something a little different from the ordinary medical journal, and yet as we sometimes deal in matters medical, we receive it all in good fellowship and wish it a successful journey.

"The Pharmacology of the Newer Materia Medica" deals only with certain of the drugs discovered within the past ten or twelve years; and its life, in its present form, will be but short.

The study in each case begins with the botany of the plant, runs through its chemistry, pharmacy, and finally a wide range of its therapeutic action, the general conclusions being based on the opinions of many observers. The botany and chemistry of these plants is followed with the greatest care, and the chemistry, in especial, is worked out exhaustively; this is noticeably so in the articles on the Erythroxylon Coca and its alkaloids and the Rhamnus Purshiana, commonly known as Cascara Sagrada.

No work is known to us containing such a complete study of the chemistry of these plants, and this fact alone at once places this publication in the position ultimately intended for it, as a work of reference. The absence of a careful study of the physiological action of these new drugs, is partly compensated for by the extended review of their therapy, so when completed and carefully indexed, both in Materia Medica and Therapeutics it will prove a valuable addition to the library of every chemist and physician.

W. E. H.

The Golden Bough, a Study in Comparative Religion.†

This excellent work, in two volumes, handsomely bound and perfect in typographical execution, reflects credit upon its publishers, and will surely add new laurels to those already gained by its learned author.

Professor Frazer's previous work, "Totemism," had prepared the public, in a

*George S. Davis, Detroit, Mich.

†*The Golden Bough*. A Study in Comparative religion, by J. G. Frazer, M.A., Fellow of Trinity College, Cambridge. London and New York: Macmillan & Co., 1890.

measure, for this new proof of his profound scholarship and unwearied research. There is a wealth of bibliographic references and marginal annotations, in itself a liberal education in this line of study.

The religious thought of Primitive Man—which is only a terse expression for his whole life and conduct, since no act was contemplated or performed save under the guidance of, or in deference to, the powers of the invisible world—will always be to scholars a matter of intense and most fascinating interest.

Professor Frazer has approached his subject with an erudition devoid of pedantry, and a grace of style in which are happily blended purity of diction, simplicity of expression and logical argument. The sections referring to the superstitions connected with human hair, the nails, the worship of trees—curious usages still prevailing in rustic games in Europe—and a great quantity of material of the same type, will be a mine of richness to the professional student, as well as a source of pleasure to the general reader.

Among the many authorities cited we have noted with gratification the names of many officers of the military service whose expeditions, reports, or more formal works have added to the world's knowledge of the habits and customs of our own wild tribes of past days.

Souvenir Album and Sketch Book, First Infantry, I. N. G. of Chicago.

We have received, through the kindness of General James B. Fry, U. S. Army, a handsomely illustrated and printed "Souvenir Album and Sketch Book" of the First Infantry, Illinois National Guard.

The Souvenir is a memento of the dedication of the new armory of the regiment at Chicago. The Sketch Book is beautifully illustrated with portraits of officers, scenes from camp, showing the regiment at artillery and infantry drill, target practice, etc.

The descriptions and letter-press are excellent and reflect great credit upon those to whom the task of editorship and authorship fell.

We heartily reciprocate the sentiment expressed in the "Introductory:"—"It is hoped that the Souvenir,—bearing as it does the unaffected good-will of the regiment, breathing the spirit of close comradeship towards its fellow guardsmen of the State and nation, and towards its friends of the Regular establishment—may accomplish something in the pending movement for closer alliance between the Guard in different sections, and between it and the Army."

J. C. B.

United Service Magazine, London.

The United Service Magazine—a name once famous through many decades—has taken a fresh lease of life, and entered on a line suggested by existing conditions. It proposes to review "all questions affecting national interests;" and having a new proprietor, while it retains the well-known title, drops, of course, the prefix "Colburn's," under which the monthly used to travel all over the world. The six numbers before us are well filled, and show that there is not the least notion of making the Review purely technical. It appeals to no section, no party, but handles the questions affecting naval and military defense solely on their merits.

The broad character of the course begun is indicated by the mere list of contributors, which, opening with a paper by Sir Charles Dilke, ends with one from Major-General T. Bland Strange, and includes others by Vice-Admiral Sir George Tryon, K.C.B., Lord Wantage, Sir George Baden-Powell, M.P., and Colonel J. F. Maurice. The range of subjects is wide, and every one is interesting. Sir Charles Dilke dis-

courses on "Our War Organization of the Future." He wants to create a general staff, with a responsible chief to advise and guide the Secretary of State for War.

Major-General Bland's paper on "Obstacles to Imperial Federation" is a cognate topic, because it deals with many burning questions more or less the sport of "politicians." Moved by the trash talk at the "Panorama," Colonel Maurice gives a series of most interesting and instructive articles on the facts of "The Waterloo Campaign," never more lucidly set forth in outline, and followed by comments and explanations which he is so competent to offer, on the deeply interesting questions they raise.

The whole contents of the magazine are full of life.

Those articles most interesting to the American reader, besides the ones mentioned, are: "Responsibility in War," by Spencer Wilkinson; "The Soudan Campaign," by George Hooper; "The Canadian Militia," by the Marquis of Lorne; "The Re-Armament of the German Army;" "The Command of the Army and General Staff in France;" "The Smoke Attack," by Mark Hamilton; "The Cavalry Revival—A Plea for Infantry," by Captain E. A. Altham; and last and best, "A Summer Night's Dream," which we have taken the liberty of reprinting.

FOR REVIEW.

Souvenir Album and Sketch Book. First Infantry, I. N. G. of Chicago. By Lieut.-Col., Henry L. Turner. Chicago, 1890.

A Course of Instruction for Non-Commissioned Officers. By Harvey C. Carbaugh, 1st Lieut., 5th Artillery. Artillery School Press, Fort Monroe, Va.

Stratégie Tactique et Politique. Par le Général Iung. Paris, 1890.

Pawnee Hero Stories and Folk-Tales. By George Bird Grinnell. New York: Forest and Stream Publishing Co., 1889.

Campaigning with Crook. By Charles King, Captain U. S. Army. New York: Harper & Bros., 1890.

Handbook of Problems in Direct Fire. By Captain James M. Ingalls, 1st Regiment Artillery, U. S. Army. New York: John Wiley & Sons, 1890.

Notes on Military Hygiene, for Officers of the Line. A syllabus of lectures at the U. S. Infantry and Cavalry School. By Alfred A. Woodhull, Major Med. Dept., Bvt Lt.-Col., U. S. A. New York: John Wiley & Sons, 1890.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Revista de la Union Militar. (July and August, 1890.)

Revista Cientifico Militar. (June.)

Boletin del Centro Naval. (May.)

BELGIUM.

La Belgique Militaire. Study on our Cavalry. The New English Rifle. Firing Experiments.

ENGLAND.

Proceedings of the Royal Artillery Institution. (August, 1890) The Military Defense Forces of the Colonies. A Range and Training Indicator.

The Illustrated Naval and Military Magazine. (August, 1890) Epochs of the British Army. Great Commanders of Modern Times. Napoleon. Naval Warfare. French Torpedo Vessels in 1890. The American War, 1861-1865. Some Russian Ideas on Fortification. The Haversack. (September) Recent Changes in the German Army. Naval Warfare.—XV. British Battle-fields in Portugal. The American Naval War of 1812. Scientific and Humane Horse-Taming. The Bulgarian Army.

Journal of the Royal United Service Institution. (Vol. 34, No. 153) The Drill and Training of Volunteer Infantry. Infantry Training. The Sanitation of Barracks. Notes on the Defense of a Modern Fortress. Cavalry Equipment. Organization and Distribution. Naval Warfare, 1860-1889. System of Signalling Between Man-of-War and Merchant Vessels.

The United Service Magazine. (June, 1890) The Canadian Militia. A Summer Night's Dream. A Conference of the Powers. (July) The Re-Armament of the German Army. The Best Mounted arm for the Volunteers. The African Mania. (August) National Insurance. The East in 1890. The Present State of the Powder Question. The Command of the Army and the General Staff in France. A Naval General Staff.

The United Service Magazine. (September, 1890) The War Training of the Navy.—II. How the Political and Military Power of England is Affected by the Suez Canal. The Clothing of the Army. Defects in Administration. Waterloo.—V. Historical Difficulties. The Three Staffs. The Smoke Attack.

FRANCE.

Revue Militaire de L'Etranger. (July and August, 1890) War Schools in Russia. The Law of July 15, 1890 and the Peace Effectives of the German Army. The Military Constitution of Roumania. The Manufacture of Rifles for the Hungarian Landwehr.

Revue du Cercle Militaire. The Trans-Saharan Railway. Roman Fortification. The New Austro-Hungarian Musketry Regulations. Regulations for Manœuvres. The New German Musketry Instructions.

Le Progrès Militaire (To date). The Revolution in Cavalry Tactics. The Manœuvres of 1890.

INDIA.

Journal United Service Institution of India. (Vol. 19, No. 81, 1890) The Organization and Employment in War of Native Cavalry. (Prize Essay).

ITALY.

Rivista di Artiglieria e Genio. (June, July and August, 1890) The Walls of Rome. On the Use of Mineral Oil for Lubrication. A New Method of Determining the Velocity of Projectiles in the Gun. Changes in the Matériel of the French Field Artillery.

NEW SOUTH WALES.

United Service Institution of New South Wales. The Australian Soldier. Lecture by Capt. M'Cutcheon, 1st Reg't. Vol. Infantry. (Hon. Sec.)

SPAIN.

Memorial de Artilleria. (July and August, 1890.)

UNITED STATES.

The Century. (September, 1890) Our New Naval Guns. The Autobiography of Joseph Jefferson. XI. How California came into the Union. The California Boundary Question in 1849. In the Marble Hills. (October) The Autobiography of Joseph Jefferson, Conclusion. An Artist's Letters from Japan. In Dark New England Days. Partisan Recognition of the Independent Voter. The Merit System in the Fifty-first Congress. An Anecdote of Sheridan. McClellan's Candidacy with the Army.

The North American Review. (September, 1890) The Federal Election Bill. Our Fur-Seal Fisheries. The McKinley Bill in Europe. The Pan-American Conference. Client and Architect. (October) A Word as to the Speakership. A Key to Municipal Reform. Crowns and Coronets. The Future of American Universities. Labor Tendencies in Great Britain. The Peculiarities of the South.

The Popular Science Monthly. (September, 1890) Some Natives of Australasia. Wild Horses. The African Pygmies. Sketch of Thomas Corwin Mendenhall. (October) Barrier Beaches of the Atlantic Coast. Invisible Assailants of Health. Irrigation in China. Rice and its Culture.

Proceedings of the United States Naval Institute. (Vol. 16, No. 54) Navy Boats. The Howell Automobile Torpedo. Desertion and the Bertillon System for the Identification of Persons. Naval Training.

Harper's Monthly Magazine. (September, 1890) Across the Andes. Mountain Passes of the Cumberland. Harvard University in 1890. The Social Side of Yachting. The Stone Axe. (October) New Moneys of Lincoln's Administration. A White Uniform. Antoine's Moose-yard. The Dragoness. Port Tarascon.

The Railroad and Engineering Journal. (September, 1890) The Harlem River Bridges. The Isthmus Canals. The New Battle Ships. The Development of Armor. United States Naval Progress.

Political Science Quarterly. (September, 1890) Recent Centralizing Tendencies. State Control of Corporations. German Historical Jurisprudence.

Magazine of American History. (September, 1890) The Rifle in Colonial Times. The Battle of Queenstown Heights. Dead Man's Island and the Ghost Ship. Judge Amasa J. Parker. (October) The American Flag and John Paul Jones. About Some Public Characters in 1786. Anecdotes of General Grenville M. Dodge. The Story of Roger Williams retold.

The United Service. (September, 1890) The Capture of Philadelphia and the Attack of the British Fleet on the Defenses of the Delaware, 1777. Napoleon II. History of the Mormon Rebellion of 1856-57. Obligatory Military Service for the Spanish-American Republics.

Transactions of the American Society of Civil Engineers. (May, 1890) A New Graphical Solution of the Problem. What Position a Train of Concentrated Loads must have in Order to Cause the Greatest Stress in any given Part of a Bridge, Truss, or Girder. (June) A Method of taking Cross-Sections in Deep Rock Cuts by Triangulation. Observations on the Forth Bridge.

Pennsylvania Magazine of History and Biography. (October, 1890) Itinerary of General Washington from June 15, 1775, to December 23, 1783. The Leaders of the Old Bar of Philadelphia.

Monthly Weather Review (To date).

Publications of Department of Agriculture (To date).

Science (To date).

The Army and Navy Register (To date).

Philadelphia Weekly Times (To date).

The Boston Courier (To date).

Home and Country (To date).

Kansas City Times (To date).

Table Talk (To date).

The Electrical World (To date).

The New York Critic (To date).

Pharmacology of the Newer Materia Medica (To date).

The Johns Hopkins University Publications (To date).

The 7th Regiment Gazette (N. Y.) To date.

St. Nicholas (To date).

Outing. (October, 1890) Rancho del Muerto. The National Guard of Minnesota.

The Pheasant in Old Britain. Fox Hunting in the Genesee Valley. Cycling
Round and About My Home. A Canoe Trip down the Chippewa.

Historical Sketches of the Army.

THE following named officers have volunteered, or have been designated, to prepare Historical Sketches of their Corps or Regiments for publication in this JOURNAL.

<i>Medical Department</i>	SURGEON CHAS. SMART.
<i>Pay Department</i>	MAJOR A. B. CAREY.
<i>Signal Corps</i>	LIEUT. WM. A. GLASSFORD.
<i>1st Cavalry</i>	LIEUT. R. P. P. WAINWRIGHT.
<i>2d Cavalry</i>	MAJOR A. E. BATES.
<i>3d Cavalry</i>	LIEUT. THOS. B. DUGAN.
<i>5th Cavalry</i>	CAPT. CHAS. KING.
<i>6th Cavalry</i>	LIEUT. F. G. HODGSON.
<i>7th Cavalry</i>	LIEUT. E. A. GARLINGTON.
<i>1st Artillery</i>	COLONEL L. L. LANGDON.
<i>4th Artillery</i>	LIEUT. A. B. DYER.
<i>2d Infantry</i>	GEN. FRANK WHEATON.
<i>3d Infantry</i>	CAPT. WM. GERLACH.
<i>4th Infantry</i>	LIEUT. JAS. A. LEYDEN.
<i>6th Infantry</i>	LIEUT. CHAS. BYRNE.
<i>7th Infantry</i>	LIEUT. A. B. JOHNSON.
<i>8th Infantry</i>	LIEUT. W. P. RICHARDSON.
<i>9th Infantry</i>	LIEUT. E. B. ROBERTSON.
<i>10th Infantry</i>	LIEUT. S. Y. SEYBURN.
<i>11th Infantry</i>	LIEUT. R. C. J. IRVINE.
<i>12th Infantry</i>	LIEUT. CHAS. W. ABBOT, JR.
<i>13th Infantry</i>	LIEUT. M. J. O'BRIEN.
<i>14th Infantry</i>	COLONEL T. M. ANDERSON.
<i>15th Infantry</i>	LIEUTS. G. K. MCGUNNIGH and G. A. CORNISH.
<i>16th Infantry</i>	CAPT. WM. V. RICHARDS.
<i>17th Infantry</i>	LIEUT. GEORGE RUHLEN.
<i>18th Infantry</i>	COLONEL H. M. LAZELLE.
<i>19th Infantry</i>	LIEUT. C. C. HEWITT.
<i>20th Infantry</i>	CAPT. J. N. COE.
<i>21st Infantry</i>	COLONEL H. A. MORROW.
<i>24th Infantry</i>	LIEUT. H. W. HOVEY.

THE PAY DEPARTMENT.

BY COLONEL A. B. CAREY, U. S. ARMY.

PAY DEPARTMENT.

THE earliest legislation creating a Pay Department, is the resolution of the Continental Congress, in session at Philadelphia, Pa., June 16, 1775, as follows :

Resolved, " That there be one Paymaster General, and a Deputy under him, for the Army, in a separate department ; that the pay for the Paymaster General himself be one hundred dollars per month, and for the Deputy Paymaster under him, fifty dollars per month."

James Warren, of Massachusetts, was elected Paymaster-General, by Congress, on July 27, 1775.

By resolution of January 9, 1776, the Deputy Paymaster-General was authorized to appoint two Assistant Paymasters, and it was required that all the troops of the Northern Department be paid in person by him or his assistants.

Colonel Warren's resignation was accepted by Congress on the 19th of April 1776, and on the 27th William Palfrey, of Massachusetts, then aide-de-camp to General Washington, was appointed by Congress Paymaster-General of the Army, and on June 12, Ebenezer Hancock was appointed Deputy Paymaster-General for the Eastern Department.

Congress on the 9th of July, 1776, resolved : " That Mr. Palfrey, late aide-de-camp of General Washington, have the rank of Lieutenant-Colonel in the Continental Army," and on the 16th a regimental paymaster for each regiment was provided at a salary of \$26 $\frac{2}{3}$ per month, and by resolution of October 10th, regimental paymasters were to have " the rank of First Lieutenants and rations as Captains."

Deputy Paymaster-Generals were appointed by Congress for Virginia and Pennsylvania on July 11, 1777, and for Georgia on August 6th. On the 20th the pay of the Paymaster-General was increased to \$150, and that of the Deputy under him to \$75 per month. By the resolution of August 28th, the Deputy Paymaster-Generals of the Northern, Eastern and Southern Departments were empowered to appoint assistants when necessary. On May 27, 1778, Congress resolved, " That the paymaster of a regiment be chosen by the officers of the regiment out of the captains or subalterns, and appointed by warrant issued by the Commander-in-chief, or the commander in a separate department." They were required to take charge of the clothing for the troops, and to distribute the same. By resolution of January 21, 1779, Congress directed that the Paymaster or Deputy Paymaster-General should provide an office near headquarters, and on May 29th, the Paymaster-General was required to keep his office in the place where

Congress should, from time to time, hold its sessions. Authority was given for the employment of clerks, directions for keeping regular books; and, in general terms, the duties of the office were defined. A Deputy Paymaster-General was authorized, by the same resolution, for the army under the immediate command of General Washington. On November 12, 1779, Congress granted the sum of \$20,000 to Paymaster-General William Palfrey, as a further compensation for past services, and allowed the Paymaster-General salary at the rate of \$14,000 per annum until further order of Congress. Colonel Palfrey had filled the office of Paymaster-General since April, 1776. "During this period he had exhibited such proofs of his talents for business, fidelity and devotedness to the cause of his country, that, on the 4th of November, 1780, he was elected Consul General from the United States to France, an office at this time of much consideration, as it involved the duties of making extensive purchases of military and other supplies for the country, and an examination and settlement of all the accounts in which the United States were concerned with public and private agents in Europe, and which had been multiplying and accumulating since the commencement of the war.

"He sailed for France, but the vessel in which he took passage was lost at sea, and every one on board was supposed to have perished."*

Colonel Palfrey was succeeded as Paymaster-General by John Pierce, of Connecticut, who was elected to the office by Congress on January 17, 1781.

General officers had been empowered by Congress to draw warrants on the Paymaster-General for payment of troops under their command. On a report from the Secretary of War, to whom was referred a plan of the Paymaster-General for the better regulation of the pay of the army, Congress, on April 8, 1782,

Resolved, "That as all returns necessary to check the accounts of pay and rations, and to give full information of public issues of clothing and stores, are lodged at the War Office, the Secretary of War is hereby empowered and directed to issue his warrants on the Paymaster-General, in favor of each regimental paymaster, for the pay and rations which shall appear, on adjustment of their accounts to be due to the regiments respectively, and to the head of each department, for the pay and rations due to such department; that the accounts for the pay and rations of each regiment, and of each department in the army, from January 1, 1782, shall be made out at the end of every month, and be transmitted to the War Office for examination and warrants:

"That the manner of making the payments, of keeping the accounts, and the returns of the regimental paymasters be regulated by the Secretary of War:

"That the Paymaster-General shall pay on the warrants of the Secretary of War, from such monies as shall be put into his hands for the pay and rations of the troops, and to the orders of the Commander-in-Chief, or officer commanding the Southern army, from such monies as shall be placed in his disposal for contingencies.

Resolved, "That all resolutions heretofore passed empowering general officers to draw warrants on the Paymaster-General, except that empowering the officer commanding the Southern army, be, and the same are hereby repealed."

* Spark's Writings of Washington.

Resolved, "That there be one Deputy-Paymaster for the Southern army :

"That there shall be one assistant allowed to the Paymaster-General, who shall do the duties of a clerk :

"That the Paymaster-General be, and he is hereby, authorized to appoint his deputy and his assistant :

"That the Paymaster-General immediately give bonds with two sureties, to the Superintendent of Finance, in the sum of \$15,000, for the faithful performance of his office."

The Paymaster-General was authorized, on May 16th, to appoint a Deputy-Paymaster to reside with the main army.

The Revolutionary army was disbanded on the 3d of November, 1783, in pursuance of a proclamation issued by Congress on the 18th of October previous. On April 1, 1785, Congress resolved that 700 troops were necessary for the protection of the north-western frontier, and on April 12, 1785, specified the number which should be furnished by certain States, and provided that a lieutenant should act as Paymaster.

The resolve of Congress of the 20th of October, 1786, increased the number to 2040 non-commissioned officers and privates. The army was fixed by the resolve of October 3, 1787, at

1 regiment of Infantry, 8 companies.

1 battalion of Artillery, 4 companies.

Paymaster-General John Pierce had been continued in service settling his accounts, and as commissioner for settling the accounts of the army. The two offices were united by resolution of Congress of March 23, 1787, as follows:

Resolved, "That the services and duties of Paymaster-General be, and hereby are, united with those of Commissioner of Army Accounts." John Pierce died in August, 1788.

The first session of the first Congress of the United States was held on the 4th of March, 1789, at New York.

The Act of September 29, 1789, recognized the force authorized by the resolve of October 3, 1787, "to be the establishment for the troops in the service of the United States." The pay and allowances were to be the same as had been established by the resolution of April 12, 1785.

The Act of April 30, 1790, directed an increase of the force, and provided a paymaster for the battalion of artillery.

After the death of John Pierce in 1788, the duties of the office of Paymaster-General were administered by Joseph Howell, Jr., Commissioner of Army Accounts, until a paymaster for the Army was provided by the Act of May 8, 1792, as follows:

Section 3. "That there be a paymaster to reside near the headquarters of the troops of the United States. That it shall be the duty of the said paymaster, to receive from the treasurer, all the monies which shall be intrusted to him for the purpose of paying the pay, the arrears of pay, subsistence, or forage, due to the troops of the United States. That he shall receive the pay abstracts of the paymasters of the several regiments or corps, and compare the same with the returns or muster rolls which shall accompany the said pay abstracts. That he shall certify, accurately, to the commanding officer, the sums due to the respective corps, which shall have been examined

as aforesaid, who shall thereon issue his warrant on the said deputy paymaster for the payment accordingly. That copies of all reports to the commanding officer, and the warrants thereon, shall be duly transmitted to the office of the accountant of the War Department, in order to be there examined, and finally adjusted at the Treasury. That the said paymaster shall give bond in the sum of \$20,000, with two sufficient sureties, for the faithful discharge of his duty; and he shall take an oath faithfully to execute the duties of his office. That the compensation to the said paymaster shall be \$60 monthly, with the same rations and forage as a major."

Caleb Swan, of Massachusetts, was appointed Paymaster of the Army on May 8, 1792, and continued in the office until the 30th of June, 1808.

Act of May 9, 1794, directed the raising of 764 enlisted men, to be incorporated with the Corps of Artillery, and to be denominated the Corps of Artillerist, and Engineers, of four battalions, with an adjutant and paymaster to each battalion.

A Paymaster-General was provided by the act approved May 30, 1796, and it was further provided that paymasters of regiments should be appointed from the subalterns of their respective regiments. The general staff authorized by the act was to continue in service until the 4th of March following, and no longer.

Act of May 3, 1797, to amend and repeal in part the previous act, provided for a Paymaster-General.

A regiment of Artillerists and Engineers was provided by the act of April 27, 1798, with an Adjutant and Paymaster to each battalion.

The act of May 28, 1798, to raise a provisional army, provided for the employment of a Paymaster-General, by and with the advice and consent of the Senate, who should have the rank, pay, and emoluments of a Lieutenant-Colonel.

The act of July 16, 1798, to augment the Army of the United States, provided for the appointment of one Paymaster to each regiment.

The act for the better organizing of the troops of the United States, and for other purposes, approved March 3, 1799, provided for one Paymaster to each regiment of cavalry, artillery and infantry. The same act provided for the appointment of Deputy Paymasters, and prescribed the bond to be given by the several regimental paymasters, as follows:

Section 15. "That the Paymaster-General of the armies of the United States, shall always quarter at or near the headquarters of the main army, or at such place as the Commander-in-Chief shall deem proper; and that, to the army on the western frontiers, and to detachments from the main army, intended to act separately for a time, he shall appoint Deputy Paymasters, who shall account to him for the money advanced to them, and shall each give a bond, in the sum of \$15,000, with sufficient sureties, for the faithful discharge of their duties respectively, and take an oath faithfully to execute the duties of their offices; and the several regimental paymasters shall also give bond, in the sum of \$5000, with one or more sufficient sureties, and take an oath, as aforesaid, for the faithful discharge of the duties of their offices respectively; and that the Paymaster-General shall receive \$80 per month, with the rations and forage of a major, in full compensation for his services and travelling expenses; and the deputy, in addition to his pay, and other emoluments, \$30 per month, in full compensation for his extra services and travelling expenses."

Act of March 16, 1802, fixing the military peace establishment, provided that from and after June 1, 1802, the peace establishment should be composed of one regiment of artillerists, two regiments of infantry, and a corps of engineers. Section 3 of this act provides:

“One Paymaster of the Army, seven paymasters, and two assistants, to be attached to such districts as the President of the United States shall direct, to be taken from the line of commissioned officers, who, in addition to their other duties, shall have charge of the clothing of the troops.” With pay as follows: “To the Paymaster of the Army, \$120, without any other emolument, except such stationery as may be requisite in his department and the use of the public office now occupied by him; each Paymaster attached to districts, \$30, and each assistant to such Paymaster, \$10, in addition to his pay in the line.”

Section 13 of this act provides:

“That the said corps shall be paid in such manner that the arrears shall at no time exceed two months, unless the circumstances of the case shall render it unavoidable.”

Section 16:

“That the Paymaster shall perform the duties of his office, agreeably to the direction of the President of the United States, for the time being: [*and before he enters on the duties of the same, shall give bonds, with good and sufficient sureties, in such sums as the President shall direct, for the faithful discharge of his said office*; and shall take an oath to execute the duties thereof with fidelity; and it shall, moreover be his duty to appoint from the line, with the approbation of the President of the United States, the several Paymasters to districts and assistants prescribed by this act; and he is hereby authorized to require the said Paymasters to districts, and assistants, to enter into bonds, with good and sufficient surety, for the faithful discharge of their respective duties].”

The Act of March 16, 1802, seems to have done away with regimental and battalion paymasters, but the office was again created by the act of April 12, 1808, which provided an additional military force of five regiments of infantry, one of riflemen, one of light artillery, and one of light dragoons, with one paymaster to each regiment, with \$10 per month in addition to pay in the line, and \$6 for forage when not furnished in kind.

Caleb Swan resigned as Paymaster of the Army on the 30th of June, 1808, and was succeeded by Robert Brent, of the District of Columbia.

The act of January 11, 1812, provided one Paymaster to each of the ten regiments of infantry, two of artillery and one of light dragoons raised by that act. The act of April 29, 1812, provided a Paymaster for the Corps of Engineers, to be taken from the subalterns. This was repealed by the act of July 5, 1838, which provided for transfer of the Paymaster of the Corps of Engineers to the Pay Department of the army. The act May 16, 1812, provided:

“That the President of the United States be, and he hereby is, authorized and empowered to appoint so many district paymasters as, in his judgment, the service may require; and, if such paymasters are taken from the line of the army, they shall respectively, receive \$30 per month, in addition to their pay in the line: *Provided*, The same shall in no case exceed the pay and emoluments of a major; and, if not taken from the line, they shall receive the same pay and emoluments as a major of infantry.”

Section 2 :

"That the President of the United States be, and he hereby is, authorized and empowered to appoint a paymaster to each regiment on the peace establishment, who shall receive the same pay and emoluments as a captain of the regiment to which he belongs: *Provided*, That all district and regimental paymasters shall be subject to the rules and articles of war, and give such bonds to the United States as the secretary of the department of war may direct, for the faithful performance of their duties. And it shall be the duty of the commanding officer, when requested by the paymaster, to furnish a capable non-commissioned officer or soldier to aid him in the discharge of his duty, who, while so employed, shall receive double pay.

The act of June 26, 1812, provided that there be one paymaster to each regiment authorized by that act. And the act of July 6, 1812, authorized the President to appoint one Deputy Paymaster General from the line, to any army, other than that in which the Paymaster of the Army shall serve, with \$50 per month in addition to his pay in the line, "and assistant deputies (not exceeding three to each department) as the public service may require, who shall, in like manner, be taken from the line, and who shall, each, be entitled to \$30 per month, in addition to his pay and other emoluments, which shall be in full compensation for his extra services."

The act of January 29, 1813, provided one paymaster for each regiment raised under that act, and the acts referred to therein; as does the act of February 10, 1814, entitled "An act to raise three regiments of riflemen."

Section 20 of the act of March 30, 1814, provided "That in no case shall the district paymasters or quartermasters of any grade be taken from the line of the army," and this act does not provide Regimental or Battalion Paymasters for the organizations created by it.

The act of April 18, 1814, fixed the annual salary of the Paymaster of the Army at \$2000, and allowed a sum for clerk hire and contingent expenses of office. Also authorized the appointment of Assistant District Paymasters, and defined the duties of Paymaster, District and Assistant District Paymasters.

The act of March 3, 1815, reduced and fixed the military peace establishment at 10,000 men, and provided that there should be one Paymaster to each regiment, to be taken from the subalterns of the line.

By this act the office of District and Assistant District Paymaster was abolished, but the act did not affect the office of Paymaster of the Army, or of Deputy Paymaster General. By Executive General Orders of May 17, 1815, two Deputy Paymasters and two Assistant Deputy Paymasters were provisionally retained.

The act of April 24, 1816, organizing the general staff and making further provision for the Army of the United States, provided for a Pay Department as follows:

Section 3, "That the pay department shall consist of one paymaster general of the army, with the annual salary of two thousand five hundred dollars, and that, in addition to regimental paymasters, there be appointed one paymaster to each battalion of the corps of artillery, who, as well as the regimental paymasters, in addition to the regular and punctual payment of their respective regiments or corps, shall discharge the duties of district paymasters within such district as shall, from time to time, be

assigned them by the paymaster general, under the direction of the secretary of war. *Provided*, That regimental and battalion paymasters may be taken either from the subalterns of the army, or citizens, and appointed by the President of the United States. *Provided, also*, That regimental and battalion paymasters shall receive the pay and emoluments of major, and shall be allowed a capable non-commissioned officer as clerk, who, while so employed, shall receive double pay, and the actual expense of transportation while traveling under orders in the discharge of his duty."

Section 4 of this act defines the duties of regimental and battalion paymasters.

Section 6 prescribes that good and sufficient bonds shall be given.

Robert Brent resigned as Paymaster General on the 28th of August, 1819, and was succeeded by Nathan Towson, of Maryland. Colonel Towson was appointed Colonel, Second Artillery, on the 1st of June, 1821, but his appointment was negatived by the Senate. On the appointment of Colonel Towson to the Artillery, June 1, 1821, Daniel Parker, of Massachusetts, then Adjutant and Inspector General of the Army, was appointed Paymaster General, but was superseded on the 8th of May, 1822, by the reappointment of Colonel Towson, who continued in office as Paymaster General of the Army until the date of his death.

Section 9 of the act of March 2, 1821, provided "That there shall be one paymaster general, with the present compensation, and fourteen paymasters with the pay and emoluments of regimental paymasters."

In the annual report of Paymaster General B. W. Brice, for 1868, General Towson is referred to as the author of the present organization of the Pay Department and the arrangement of its duties, giving to paymasters the field grade of major, and making it an independent staff corps. In a report dated April 29, 1839, to the Secretary of War he (Towson) gives the following facts in the history of army paymasters :

First.—From 1808 to 1811, before the war, the average annual loss by the defalcation of regimental and battalion paymasters amounted to 1.58 per centum on the amount disbursed, and the annual average expenses for paying the army to 3.10 per centum.

Second.—From the beginning of the war to 1816, under the same system, these averages were : defalcations, 2.98 per cent., and the expenses, 4.36.

Third.—From the date of the reorganization, in 1821, on the new plan (the present one) to 1825, the average defalcations were 22-100; little more, it will be perceived, than the one-fifth of one per cent., which was finally paid into the Treasury ; expenses for the same period, 2.13.

Fourth.—From 1825, after the new system had been well established, *not one dollar of defalcation*, and the total average expenses reduced to one and one-third per cent.

Section 4 of the act of July 14, 1832, provided, "That it shall be the duty of the district paymasters of the army of the United States, in addition to the payments required to be made by them to the regular troops, to make payment to all other troops in the service of the United States, whenever required thereto by order of the President."

"Section 2 of the act of March 2, 1833, authorized the Secretary of War to allow, and pay, district paymasters a commission, not exceeding

one per centum upon the amounts paid by them, respectively, to the militia ordered into the service of the United States according to law.

The act of July 4, 1836, authorized the appointment of three paymasters, and provided for the detail of any officer of the army to the duty of Paymaster, when volunteers or militia were called into service.

This is replaced in part by section 25 of the act of July 5, 1838, and modified by section 31 of the same act, which prohibits the separating of any officer of the line of the army, employed as Paymaster, from his regiment or company. (See R. S. sec. 1224.)

Section 24, act of July 5, 1838, provides: "That hereafter the officers of the pay and medical departments of the army shall receive the pay and emoluments of officers of cavalry of the same grades respectively according to which they are now paid by existing laws."

Section 25 provides for a temporary expansion of the Pay Department whenever militia or volunteers are called into service, as follows:

"That when volunteers or militia are called into the service of the United States, so that the paymasters authorized by law shall not be deemed sufficient to enable them to pay the troops with proper punctuality, it shall be lawful for the President to appoint as many additional paymasters as he shall deem necessary, who shall perform the same duty, give the same bond, be subject to the same liability, and receive the same pay and emoluments, as are now provided for paymasters of the army: *Provided, however,* That the number so appointed shall not exceed one for every two regiments of militia or volunteers: *And provided also,* That the persons so appointed shall continue in service only so long as their services are required to pay militia and volunteers."

Under the authority given by the foregoing section of July 5, 1838, the Pay Department was increased during the war with Mexico and the war of the rebellion by the appointment of a number of Additional Paymasters sufficient for the payment of the volunteer force called into the service of the United States, as follows:

ADDITIONAL PAYMASTERS.

Employed during war with Mexico.....	17	
Accounted for as follows:		
Died.....	2	
Resigned.....	2	
Discharged (disbanded March 4, 1849).....	9	
Retained in permanent establishment.....	4	17
Subsequently appointed in permanent establishment.....		1
Employed during the war of the rebellion.....	562	
Died.....	28	
Resigned.....	171	
Cashiered.....	3	
Dismissed.....	14	
Honorably mustered out of service.....	318	
Retained in permanent establishment.....	28	562
Subsequently appointed in permanent establishment.....		17

Section 9 of the act of July 7, 1838, allowed the Paymaster-General and Surgeon-General of the army the additional rations for every five years' service, granted by the act of July 5, 1838.

The act of June 17, 1846, authorized an increase of three paymasters.

The department was again increased by section 12 of the act of March 3, 1847, which authorized the President "to add to the pay department of the army two deputy paymaster-generals, with the pay and allowances, each, of a deputy quartermaster-general, and ten paymasters, with the pay and allowances, each of a paymaster of the army; and the officers so appointed shall give such bonds as the President shall, from time to time, direct: *Provided*, That the deputy paymaster-generals shall, in addition to paying troops, superintend the payment of armies in the field."

The ten paymasters appointed under this act were to be disbanded on the 4th of March, 1849, under section 3 of the act of July 19, 1848.

Section 13: That the officers of the pay department shall have rank corresponding with the rank to which their pay and allowances are assimilated: *Provided*, That paymasters shall not in virtue of such rank be entitled to command in the line or other staff departments of the army: *Provided, also*, that the right to command in the pay department, between officers having the same rank, shall be in favor of the oldest in service in the department, without regard to the date of commission under which they may be acting at the time."

The last proviso of this section being sequent upon the act of May 15, 1820, which required a reappointment every four years, is obsolete; rank being determined by date of commission or appointment.

Section 14. "That all paymasters hereafter to be appointed by the President for the volunteer service of the United States shall be nominated to the Senate for confirmation to such office."

The act of August 12, 1848, authorized the Paymaster-General to allow to any Paymaster of the army who had been employed in the payment of volunteers, during the war with Mexico, a commission, not exceeding one-half of one per centum, on all sums disbursed by them to volunteers, provided said commission did not exceed \$1000 per annum, from commencement to close of the war.

The act approved March 2, 1849, provided

"That the pay department of the army shall consist of a paymaster-general, who shall have the rank of colonel, and the same pay and allowances as are at present provided by law for such officers, and the same tenure of office as the heads of other disbursing departments of the army; two deputy paymasters-general, with the same rank, pay and allowances as are now provided by law for such officers, and the same tenure of office as officers of like grade in other disbursing departments of the army; and twenty-five paymasters, with the same rank, pay, and allowances as are now provided by law for such officers, and the same tenure of office as officers of like grade in other disbursing departments of the army. That it shall be the duty of all disbursing officers of the pay department to renew their bonds, or furnish additional security, at least once in four years, or as much oftener as the President may direct.

"That the officers of the Pay Department, provided for by the first section of this act, shall consist of the paymaster-general, the two deputy paymasters-general now in commission, the fifteen paymasters who were in service under the acts in force at the

commencement of the war with Mexico, and ten paymasters to be selected from the additional paymasters now in service, and the thirteen paymasters authorized by the acts of the 17th of June, 1846, and the 3d of March, 1847."

There does not appear to have been any further legislation relative to the Pay Department, and the organization, as provided by the above act, continued until 1866. Colonel Nathan Towson died at Washington, D. C., on the 20th of July, 1854, and was succeeded as Paymaster-General, by the promotion of Colonel Benjamin F. Larned, of Massachusetts, then Deputy Paymaster-General, who continued in office to the date of his death, at Washington, D. C., September 6, 1862.

Colonel Timothy P. Andrews, of the District of Columbia, then Deputy Paymaster-General, was promoted to be Paymaster-General, on September 6, 1862, and continued in the office until he was retired, on his own application, after forty or more consecutive years of service, in conformity with Section 15 of the act of August 3, 1861. Colonel Andrews was succeeded by Benjamin W. Brice, of Virginia, then a Major and Paymaster, fifth in rank in the Pay Corps, who was appointed Paymaster-General, November 29, 1864, with the rank of Colonel, to July 28, 1866, and Brigadier-General since that date.

The statistics of the Pay Department show that during the war of the rebellion, in which it disbursed \$1,100,000,000, the defalcations and losses of all kinds were less than one-tenth of one per cent., and the cost of paying the troops, including expenses, defalcations and losses of all kinds, falls short of three-fourths of one per cent. on the amount disbursed; that chiefly within the three months of June, July and August, 1865, \$270,000,000 were paid to 800,000 individual men by the small regular force of the Pay Department and the additional force employed under the act of July 5, 1838, which drew from General Brice the following in his annual report for 1865:

"No similar work of like magnitude, regarding its immensity both as to men and money and the small limit of time in which it has been performed, has, it is believed, any parallel in the history of armies * * *," and vindicates the language used by him: "No system can be devised which, equal to the present one, can be made to combine the advantages of prompt payment, the safety of the public money, and an accurate and prompt accountability, with the least possible liability to embezzlement or corrupt defalcation."

Section 18 of the Act of July 28, 1866, provided "That the pay department of the army shall hereafter consist of one paymaster-general, with the rank, pay, and emoluments of a brigadier-general; two assistant paymasters-general, with the rank, pay, and emoluments of colonels of cavalry; two deputy paymasters-general, with the rank, pay, and emoluments of lieutenant-colonels of cavalry; and sixty paymasters, with the rank, pay, and emoluments of majors of cavalry, to be selected from persons who have served as additional paymasters."

Section 23 provides that the Paymaster-General shall be appointed by selection from the Corps to which he belongs.

Section 6 of the act of March 3, 1869, prohibited new appointments and

promotions in the Pay Department, but was so far modified by the act of June 4, 1872, as to authorize the President to "appoint a Paymaster-General, with the rank, pay and emoluments of a colonel, to date from the time the appointee assumed the duties of the office, to fill the vacancy now existing.

General Brice at his own request was retired from active service on January 1, 1872, in conformity with Section 12 of the act of July 17, 1862.

Benjamin Alvord, of Vermont, then a Major and Paymaster, fourth in rank in the Pay Corps was selected and appointed Paymaster-General of the army, with the rank of Colonel, from January 1, 1872.

The act of March 2, and Joint Resolution of March 3, 1875, established the number of paymasters at fifty and authorized the appointment of majors; and by the act of July 22, 1876, the rank of paymaster-general was made brigadier-general, under the authority of which General Alvord was appointed brigadier-general.

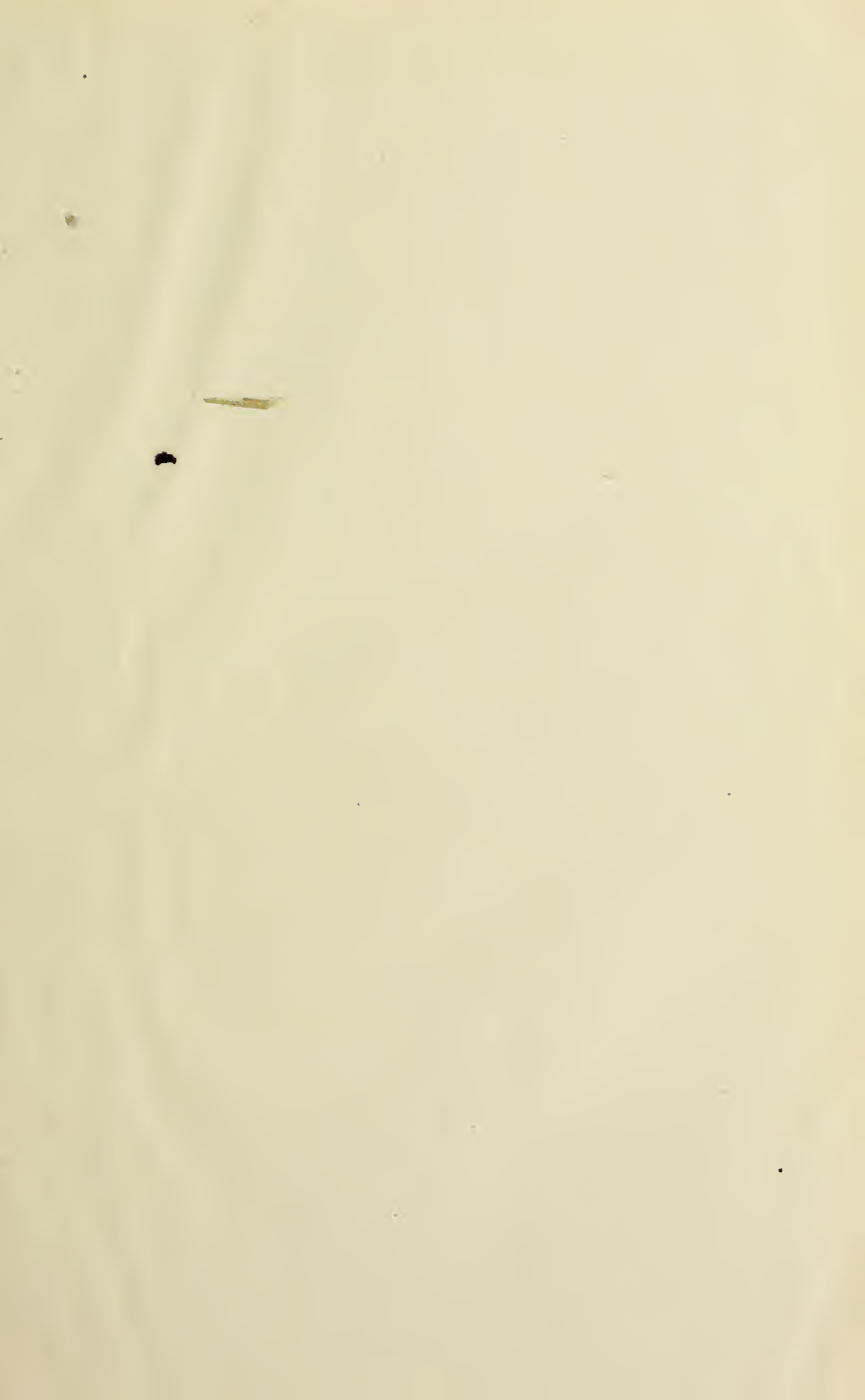
The act of March 3, 1877, repealed so much of the act of March 3, 1869, as prohibited promotions in the Pay Department.

General Alvord was retired on June 8, 1880, at his own request, having served over forty years (Sec. 1243 R. S.); and Nathan W. Brown, of New York, the senior colonel, was selected and appointed Paymaster-General same date, and retired on the 6th of February, 1882, under the provisions of Sec. 1244 R. S.

William B. Rochester, of New York, then a major and paymaster, tenth in rank in the pay corps, was selected and appointed paymaster-general on February 17, 1882.

The act of July 5, 1884, making appropriations for the support of the army for the year ending June 30, 1885, provides: that hereafter any paymaster of the rank of major who has served twenty years in the United States Army as a commissioned officer may, upon his own application or by direction of the President, be placed upon the retired list of the army, until the pay department shall be reduced to thirty-five members, as follows: one paymaster-general, with the rank of brigadier-general; two assistant paymasters-general, with the rank of colonel; three deputy paymasters-general, with the rank of lieutenant-colonel, and twenty-nine paymasters, with the rank of major; and no more appointments of paymasters shall be made in the pay department until the number shall be reduced below twenty-nine majors, and thereafter the number of officers in the pay department shall not exceed thirty-five.

General Rochester was retired by operation of law February 15, 1890 (act of June 30, 1882), and on March 10, 1890, William Smith, lieutenant-colonel and deputy paymaster-general, was selected and appointed paymaster-general.





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